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VOL. VII.

HANSEATIC LEAGUE——LIGUSTRUM.

LONDON:
ROUTLEDGE, WARNES, AND ROUTLEDGE,
FARRINGDON STREET.
1859.

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USEFUL KNOWLEDGE.

HANSEATIC LEAGUE or HANSA, a celebrated commercial confederacy, which took its name from the ancient German word 'Hanse,' signifying an association for mutual support. The cities of Hamburg, Lübeck, and Bremen were, in the middle ages, the depositories of the manufactures of Italy and Germany, with which they supplied the northern countries of Europe in exchange for their raw produce. The wealth which they acquired excited the envy and the rapacity of the princes and nobles; the imposition of new and the augmentation of old tolls were great impediments to trade, which was likewise rendered unsafe by numerous banditti and pirates who infested the roads and the neighbouring seas and rivers. Hamburg and Lübeck concluded an alliance in 1241 by which they engaged to maintain ships and soldiers for the purpose of protecting their commerce. The city of Brunswick joined the alliance in 1247. In course of time most of the trading towns in Europe joined this association, which included London, Rouen, Bordeaux, St.-Malo, Bayonne, Marseille, Barcelona, Seville, Cadiz, Lisbon, Antwerp, Danzig, Dort, Amsterdam, Bruges, Rotterdam, Ostend, Dunkirk, Leghorn, Messina, Naples, Bergen, Novgorod, all the towns on the Baltic, the Elbe, and the Weser, Embden, Cologne, and other towns, to the number of 85. Their principal factories in foreign countries were Bruges, London, Novgorod, and Bergen. All the towns sent deputies to a congress which usually met in Lübeck. The Hanse Towns became so powerful that in 1348 they defeated the kings of Norway and Denmark, deposed Magnus, king of Sweden, and gave his crown to his nephew Albert; they equipped, in 1428, 40 ships of war and raised 12,000 troops, exclusive of seamen, in a war with Erick, king of Denmark; and in the same century they compelled Edward IV. to restore all their privileges and property in England, which he had attempted to withhold. That part of the city of London called the Steelyard was their exclusive property, and Bishops-Gate, one of the principal entrances to London, was intrusted to them to guard. But when the roads and seas were no longer insecure, when America was discovered, and India was reached by doubling the Cape of Good Hope, the Hanseatic League gradually declined, and at the last general assembly at Lübeck, in 1630, the deputies from the several cities appeared merely to declare their secession from the League. Hamburg, Lübeck, and Bremen formed an association in 1641, and remained free republics till December 1810, when they were incorporated with the French empire, but in 1813 they were again separated from France, and with Frankfurt-am-Main are now called the free Hanseatic Cities of the Germanic Confederation. (Sartorius, *History of the German Hansa*, 2 vols. 1830-4; Macgregor's *Statistics*.)

HANWAY, JONAS, was born at Portsmouth, in 1712, and died in 1786. He was a Russian merchant, connected with the trade into Persia. Business having led him into Persia, he published in 1753 his 'Historical Account of the British Trade over the Caspian Sea, with a Journal of Travels from London through Russia into Persia,' &c., 4 vols. 4to. He was made a commissioner of the navy. The Marine Society and the Magdalen Charity owe their establishment mainly to him: he was also one of the great promoters of Sunday-schools.

HAPSBURG. [HABSBURG.]

HAQUEBUT. [ARMS.]

HARDICANUTE, HARDECANUTE, or HARDACNUTE, was the eldest son of Canute the Great, king of England, Denmark, and Norway, by Emma, daughter of Richard I., duke of Normandy. [ETHELRED II.] The death of Canute, in 1035, brought forward, as claimants to the inheritance, Sweyn and Harold, his two sons by Alfgiva, daughter of the Earl of Northampton, Hardicanute, his son by Emma, and Edward, the elder of the two sons of Emma by her former husband Ethelred. A civil war was prevented by an agreement that the authority of Hardicanute should be confined to the country to the south of the Thames, and that all the rest of England should be resigned to Harold. Meanwhile Hardicanute remained in Denmark, leaving the government of his English province in the hands of his mother till the invasion of England, in 1037, by Emma's younger son Alfred, when Emma fled to the Continent, and Harold became undisputed king of all England. On the death of Harold, a deputation arrived from the English nobility, offering the crown to Hardicanute, who came over and assumed the government. His

short reign affords scarcely any events requiring to be mentioned. His character appears to have been that of a good-natured debauchee. His death happened on the 8th of June, 1042, in consequence of what appears to have been a stroke of apoplexy.

HARDNESS (in mineralogy). Mohs endeavoured to form a scale of hardness in minerals, according to the power of one mineral to scratch another. The following are ten degrees of the scale, the hardest being the diamond.

1. Talc, white or greenish.
2. Rock salt and uncrystallised gypsum.
3. Calcareous spar, cleavable.
4. Fluor spar, which cleaves perfectly.
5. Apatite, from Salzburg.
6. Adularia.
7. Rock crystal, transparent.
8. Topaz.
9. Corundum, from Bengal.
10. Diamond.

HARDOUIN, JOHN, commonly called *Père Hardouin*, was born at Quimper in Bretagne, in 1647. He entered the society of the Jesuits at an early age, and devoted himself to the learned languages, history, philosophy, and divinity. A large portion of his life was spent in undertaking to prove, chiefly from medals, that the greater part of those writings which are considered as ancient, both classical and of the early Christian age, were forged by monks of the 13th century. He excepted only the works of Cicero, Pliny's 'Natural History,' Virgil's 'Georgics,' and Horace's 'Satires and Epistles.' These he supposed to be the only genuine works of antiquity remaining, except a few inscriptions and Fasti; and that from these the monks had drawn up and published Terence's Plays, Livy's and Tacitus's Histories, Virgil's Æneid, Horace's Odes, &c. See his 'Chronologiæ ex Nummis Antiquis restitutæ Prolusio, de Nummis Herodiadum,' 4to., Paris, 1693. The Society of Jesuits at last interfered, and Hardouin, in 1708, published the recantation of his fancies.

His edition of Pliny's 'Natural History,' prepared for the use of the Dauphin, was published at first in five volumes 4to., Paris, 1685; republished with great improvements in three volumes, folio, Paris, 1723, with a copious Index. In 1715 he edited a new edition of 'The Councils,' printed at the royal press, in 12 vols. folio. Père Hardouin died at Paris, Sept. 3, 1729.

HARDWICKE, PHILIP YORKE, first EARL OF, was the son of an attorney at Dover, where he was born the 1st December, 1690. His father was not able to do much for his education, but the great abilities of the son enabled him to surmount all difficulties. He was a great favourite with Mr. Samuel Morland, a man of considerable learning, who kept a school at Bethnal Green, London, at which he was placed for a short time. When removed to the office of Mr. Salkeld, an eminent solicitor in London, his diligence and talents won the respect of that gentleman also. Mr. Salkeld caused him to be entered of the Middle Temple, in November 1708. During the time he was keeping his terms, he became acquainted with Mr. Parker, one of the sons of Lord Chief Justice Macclesfield, the consequence of which was an introduction to Lord Macclesfield, who employed him as the companion and tutor of his sons. To this lucky acquaintance the rapid and extraordinary success of Mr. Yorke at the bar is mainly attributable. In May 1715, he was called to the bar, when the support of his old benefactor Salkeld, who was in very extensive practice as a solicitor, together with the favour and patronage of Lord Macclesfield, enabled him at the very outset to acquire an extensive practice.

The elevation of Lord Macclesfield to the woolsack (1719) enabled him further to promote the interests of his favourite, and accordingly, through his influence, in the same year Yorke took his seat in the House of Commons as member for Lewes, the whole expenses of his election being defrayed by the ministry. In the same year he married Mrs. Lygon, a young widow, the daughter of Mr. Cocks, a gentleman of good estate in Worcestershire, and the niece of Lord Somers and Sir Joseph Jekyl, then master of the rolls.

In March 1720, while upon the circuit, and within five years after his call to the bar, he was, through the influence of his patron the chancellor, appointed solicitor-general; and he justified the choice by his conduct. In 1724 he was made attorney-general. It was after this period that his patron, Lord Macclesfield, was impeached for gross corruption in office, and Sir Philip Yorke had great difficulty in procuring himself to be excused from the task of assisting the managers of the Commons in making good their charge. In 1733 he was appointed lord chief justice of the King's Bench, and created Baron Hardwicke. He presided in the King's Bench for three years and a half, during which period he added largely to his former high reputation. On the death of Lord Chancellor Talbot (1737) he was raised to the dignity of lord chancellor. It is upon his judgments as chancellor that the reputation of Lord Hardwicke is principally founded. He held the great seal during nearly twenty years, and his judgments are a lasting monument of his legal knowledge and the soundness of his understanding. His integrity was never called in question. In 1754 he was created Earl of Hardwicke and Viscount Royston. He continued to hold the great seal until the 19th of November, 1756. He died on the 6th March, 1764. Lord Hardwicke's judgments are preserved, so far as the points decided by them, in the reports of Atkyns and Vesey, sen., and in a volume published from Lord Hardwicke's own notes, by Mr. West. Some notes of his decisions have also been made public by Mr. Lee. These volumes however do not give any notion of the language in which the judgments were delivered. Few specimens of his style of writing remain.

This brief memoir and the facts and dates are taken from a Life of Lord Hardwicke, in the 3rd No. of the 'Law Magazine.'

HARDYNG, JOHN, one of our old historians, was born in 1378, and at the age of twelve was admitted into the family of Sir Henry Percy

eldest son of the Earl of Northumberland, and known by the name of Hotspur, with whom he fought as a volunteer at the battles of Homildon and Cokelawe. After the death of his patron, whom he accompanied in the battle of Shrewsbury, Hardyng enlisted under the banner of Sir Robert Umfravile, who was connected with the Percies by affinity, and under whom in 1405 he became constable of the castle of Warkworth in Northumberland. How long he remained at Warkworth is unknown; but his knowledge of Scottish topography seems soon to have engaged him in the secret service of his country. The exact time when Hardyng was first sent to obtain restitution of the deeds of homage, which had been given up by Mortimer in the minority of Edward III., does not appear; but it must have been early in the reign of Henry V.

Several writers have considered our author as a dexterous and notable forger, who manufactured the deeds for which he sought reward. But whether this was the case, or that Hardyng, in his zeal for his country, became the tool of some more powerful person, or was imposed upon in the purchase of the deeds, cannot now be ascertained.

Actively as Hardyng was engaged in life, he seems to have been constantly employed in gathering materials for his Chronicle, the first composition of which he finished toward the latter end of the minority of Henry VI.

Hardyng appears to have received several grants and pensions as rewards for his services. The evening of his days was passed in the entire recomposition of his work, which was afterwards presented to King Edward IV. The history comes no lower than the flight of Henry VI. to Scotland. From a passage in which the queen is mentioned, it is evident that he could not have finished his work before 1465. How long he survived its completion is unknown, but he must then have been 87 years of age.

HARE-LIP, a malformation in which the lip is divided in one or more places by clefts extending from its free edge towards its attachment. It has received this name from the resemblance which it bears to the divided upper lip of hares and other gnawing animals, and is one of the most common of the malformations by arrest of development. Hare-lip may be single or double, that is, there may be one or two fissures—the one may be seated in the middle line of the lip, or opposite to the union of the two incisors with the canine tooth—if there be two, they will be found in the latter situation on each side. It may be simple or complicated with fissures of the gum or palate, which, being developed in an analogous manner, may be influenced by the same cause as the lips, though being earlier united they are less rarely affected.

The cure of hare-lip is important, not only for the uncouth deformity, but because sucking is prevented in infancy, and in later life the speech is affected. It is accomplished by cutting off quite smoothly the opposite edges of the fissure in its whole length, and then bringing them together and maintaining them in accurate apposition till, like the edges of a common wound, they have firmly united.

HARE-BELL. [Campanula.]

HARFLEUR. [Seine-Inférieure.]

HARICOT. [Bean.]

HARINGTON, SIR JOHN, was born at Kelston near Bath, in the year 1561. His mother was a natural daughter of Henry VIII., and his father held an office in the court of that king. Having been educated at Eton and at Christ's College, Cambridge, he, by means of his wit and accomplishments, gained the notice of Queen Elizabeth, and became a member of her court.

When the Earl of Essex was appointed Lord Lieutenant of Ireland in 1599, Harington was made a commander of horse under Lord Southampton, in his service. When Essex shortly after made his precipitate return to England, Harington was one of the few officers whom he chose to accompany him, and he came in for a share of the queen's indignation. She was angry also, we are told, that Essex had, in Ireland, conferred on Harington the honour of knighthood. On the accession of James I. in 1602, Harington continued in possession of royal favour. He now wrote for the private use of Prince Henry his 'Brief View of the State of the Church,' which is an account of the bishops who lived in the reigns of Elizabeth and James I. He died in 1612.

Sir John Harington, besides a translation of the 'Orlando Furioso,' wrote a satirical poem entitled the 'Metamorphosis of Ajax,' a volume of epigrams, and several occasional pieces in verse, most of which have never yet been published.

HARLEIAN COLLECTION. [British Museum.]

HARLESS, GOTTLIEB CHRISTOPH, a learned and laborious German philologer, was born at Culmbach in 1738, and died Nov. 2, 1815. He held several academical offices in the university of Erlangen. The most important of his publications is an edition of the 'Bibliotheca Græca' of Fabricius, Hamburg, 1790–1811, in 12 vols. 4to.

HARLEY, ROBERT, EARL OF OXFORD, was born in London in 1661, of a family of note in the county of Hereford. He entered parliament after the Revolution as member for Tregony, and afterwards sat for Radnor, professing for some time the Whig principles of his family. After a transition period however, he went fairly over to the Tories. In the House which met under the administration of Rochester and Godolphin, in February 1701, Harley was elected speaker by a great majority, and also in the next parliament. He was a third time chosen to the same office, in October 1702, and retained it till April 1704, when he was made secretary of state. He is believed to have been principally indebted for this promotion to the good offices of Miss Abigail Hill, who, according to the Duchess of Marlborough, by Harley's management became Mrs. Masham, and in return exerted all her influence to attach the weak mind of the queen to Harley and his friends. In this state of things the Marlborough party began to seek a new support by inclining towards the Whigs.

But the struggle was finally decided against Harley by the public suspicion and odium to which he became exposed in consequence of the conviction of one of his clerks named Gregg, for carrying on a treasonable correspondence with France. In the beginning of February 1708, the Duke of Marlborough and Lord Godolphin intimated to the queen that, unless Harley were removed, they would leave her service; on this, the secretary resigned, along with Mr. St. John (afterwards Lord Bolingbroke). Harley remained out of power for about two years and a half; at the end of which time Godolphin was dismissed, and Harley was appointed chancellor of the exchequer. The Duke and Duchess of Marlborough, and all their connections, were completely discarded both from office and from the queen's favour. Harley was appointed lord high treasurer, created Earl of Oxford and Earl Mortimer, and invested with the order of the garter. The peace of Utrecht, concluded 5th May, 1713, is the event for which the administration of Harley is chiefly memorable. It was after this that the jealousy between the premier and Bolingbroke assumed the character of an open rivalry. Bolingbroke had now the art to gain the favourite, Lady Masham, and on the 27th of July, 1714, the lord treasurer received his dismissal. The queen's death, three days after, put an end for ever to the political existence of both Oxford and Bolingbroke. In August 1715, both were impeached by the House of Commons. St. John made his escape to France, but Harley was committed to the Tower, and there he lay two years, when he was brought to trial before the House of Lords; but, the Commons not appearing to prosecute their impeachment, the prisoner was acquitted. After this the Earl of Oxford lived in retirement till his death, May 21, 1724.

HARLOW, GEORGE HENRY, was born in London in 1787. His father, who was a merchant, died while he was an infant. He was educated for a few years at Westminster School, but when about 16 was placed with a Flemish landscape-painter of the name of De Cort, whom he left for the late Mr. Drummond, A.R.A., the portrait-painter; and he was finally placed in the studio of Sir Thomas Lawrence, then Mr. Lawrence, with the privilege of copying pictures there, but with an especial proviso that he should receive 'no instruction of any kind.' At the expiration however of a year and a half, the master and pupil quarreled. Lawrence used to employ Harlow to dead-colour, and Harlow had so far a share in painting a much admired dog in a portrait of Mrs. Angerstein, which, at the Angersteins, he had the imprudence to claim as his own. Being dismissed from the house, Harlow revenged Lawrence's resentment by painting a caricature of his style upon a sign-board at Epsom, in one corner of which he wrote, 'T. L., Greek Street, Soho.'

He never studied at the Royal Academy: he professed to consider study in schools and academies as so much time spent in the destruction of originality. His first picture of note was Hubert and Prince Arthur; and he painted a few other historical pieces; the most celebrated of them is the Trial of Queen Catherine, of which the principal characters were portraits, Mrs. Siddons as Queen Catherine, John Kemble as Wolsey, &c. Harlow painted many portraits, of which the best is certainly that of Fuseli.

Having obtained a considerable reputation and some means, Harlow set out, in June 1818, upon a visit to Rome, where he attracted great notice and excited some wonderment by completing an effective copy of the Transfiguration, by Raphael, in 18 days. Canova was much pleased with it, and told Harlow that it looked like the work of 18 weeks; he exhibited one of Harlow's pictures at his house, and it procured him his election as a member of the academy of St. Luke, where it was also exhibited. Harlow wrote a most sanguine letter from Rome on November 23, 1818, full of hopes and plans for the future; but in less than ten weeks from that date he died in London of a virulent attack of cynanche parotidæa (mumps), on the 4th of February, 1819, in the 32nd year of his age.

HARMER, THOMAS, a Protestant dissenting minister, was born at Norwich, A.D. 1715. He received his education under the care of Mr. Eames in London, and was ordained in the twentieth year of his age as the minister of the Independent church of Wattisfield, in Suffolk. In this place he continued till his death in 1788.

The work by which Harmer is principally known is his 'Observations on various passages of Scripture, placing them in a new light; compiled from relations incidentally mentioned in books of Voyages and Travels into the East.' He was also the author of 'An Account of the Jewish Doctrine of the Resurrection of the Dead,' and of 'Outlines of a New Commentary on the Book of Solomon's Song,' 8vo. 1761.

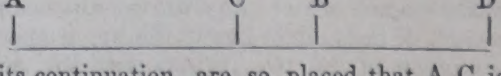
HARMO'DIUS. [ARISTOGITON.]

HARMONIC PROPORTION. The reciprocals of numbers which are in arithmetical proportion are themselves said to be in harmonic proportion; thus

$$\frac{1}{a}, \frac{1}{a+b}, \frac{1}{a+2b}, \text{ \&c.,}$$

is a series in harmonic progression.

A line A B is said to be harmonically divided when two points, C and D, one within it and one



on its continuation, are so placed that A C is to C B as A D to D B. But, in older books, it is A D, which is said to be harmonically divided by C and B.

HARMONICS (Acoustics). By the harmonic of a musical note are meant all those other notes in which the number of vibrations per second are twice, three times, four times, or any multiple of the number of vibrations which produce the note in question. Thus the harmonics of a note which is sounded by 200 vibrations per second are those notes which require 400, 600, 800, &c., vibrations per second. The harmonics of a note are infinite in number, theoretically speaking, and proceed by less and less intervals. And, since every note

may be considered as identical with any of its octaves, every harmonic has a corresponding note in any given octave. Denoting any key-note by C, and the octave above it by C′, there is no possible sound between C and C′ which is not theoretically either an harmonic of C, or as near to one as we please.

But, in practice, not only is it impossible to produce any number of harmonics we please, that is, to maintain in vibration any aliquot part we please of a string or column of air, but even among the harmonics which we can produce we find a limit to the number of those distinct harmonics which deserve the name, etymologically considered. Some few of the first harmonics are melodious sounds, considered in relation to the key-note, but others are discordant, and find no place in the scale according to any system of temperament. We shall therefore, taking a given note, say C, simply mention the most important harmonics, and reduce them to their proper places between C and C′.

Let a be the number of vibrations per second which produce C; then $2a$ is well known to produce C′, or the first harmonic of a note is its octave. The next has $3a$ vibrations, answering to G′; so that the twelfth, or octave of the fifth, is the second harmonic. The third has $4a$ vibrations, and answers to C″, the octave of the octave. The fourth harmonic has $5a$ vibrations, and gives E″, the double octave above the third, in the untempered diatonic scale. The fifth harmonic, with $6a$ vibrations, gives G″, the octave of G′ the second harmonic. In general, every harmonic whose vibrations are an even multiple of those in the key-note, is an octave to a preceding harmonic, and presents no new character. The sixth harmonic, having $7a$ vibrations, is an imperfect (being too flat) double octave to the flat seventh above the key-note, or B flat. The eighth harmonic, with $9a$ vibrations, is correctly D‴, or three octaves above the untempered major second. The tenth, with $11a$ vibrations, is a little too sharp for F‴, being $11a$ instead of $10\frac{2}{3}a$. The twelfth, with $13a$ vibrations, is a little too flat for A‴, being $13a$ instead of $13\frac{1}{3}a$.

The preceding summation is useful, as giving an account of the scale of all those musical instruments which consist of one unaltered pipe. These are the bugle, the French horn, the trumpet, and (but for its slide) the trombone; in all of which (except the last) no note can be produced except an harmonic of the fundamental note of the whole tube. Calling the fundamental note C (which however is not very easily sounded), the ordinary scale of these instruments is—

C C′ G′ C″ E″ G″ (B″ flat) C‴ D‴ E‴ F‴ G‴ A‴,

in which B″ flat is too flat, F‴ is too sharp, and A‴ too flat. A short pipe however will not produce many harmonics; the bugle goes no further than G″, at least with common lips. Various contrivances have been introduced to extend and correct this scale; the keyed bugle, the use of the hand in the French horn, the pistons sometimes applied to the same instrument, and the short slide of the trumpet, to say nothing of the slide, which is the principal distinction of the trombone, will suggest themselves to all who are acquainted with musical instruments. In other instruments harmonics are much used, particularly in those of the violin class, and the flute. The performance of Paganini upon a single string, which a few years ago created a great sensation among violin players, arose from extraordinary power of producing harmonics. In the flute, C‴ may be tained without much practice, as an harmonic the fundamental note of the instrument; and have heard of players who could produce D‴ and even E‴ in the same way. On the long strings of a piano-forte, as the fundamental note subsides, G′, C″, and E″ may be perceived; and we have heard, among the vaulted roofs of a cathedral, several of the harmonics of the notes sounded in chanting.

HARMONY (in Music), musical sounds simultaneously produced according to certain rules, forming a chord, or a succession of chords. The simplest harmony, namely, the triad, or common chord [CHORD], is the result of the vibration of all sonorous bodies, and the foundation on which much artificial harmony is built.

In addition to the details given under COUNTERPOINT, the following are some of the rules of Harmony:—

1. No two perfect concords, namely, two 5ths or two 8ths, are allowed to succeed each other in the same progression, but are permitted in contrary motion, that is, when one rises and the other falls.

2. Most discords require to be *prepared*, and all must be *resolved*; *i. e.* the dissonant note is to be first heard as a concord, and after *percussion*, or being sounded, must pass into a concord, generally by falling a tone or semitone. But sometimes the resolution is brought about by the base.

3. It is in the nature of sharpened intervals to rise, and of flattened ones to fall.

4. In music in four or more parts, the parts should be separated in a manner as nearly equal as possible: thus a more perfect symmetry is obtained, and a richer harmony produced. But, with a view to some particular effect, a very different distribution of the parts is occasionally made.

5. As a general rule, every composition, whatever its kind, is to commence in its key; but, as regards the termination, the rule is without exception and peremptory, though sometimes the third is changed from minor to major.

By Harmónia (ἁρμονία) the Greeks meant to express the proper relationship of one sound to another, the pleasing agreement of intervals, in a melody, and nothing beyond; and it is a disputed question whether the Greeks were acquainted with what is now known by the name of *Counterpoint*.

HARMO'TOME (*Andreolite*, *Ercinite*) occurs at Strontian in Scotland, in right rhombic prismatic crystals, colour grayish reddish, yellowish white; sp. gr. 2.4. Its chief constituents are silica, barytes, alumina, and water.

HARO. [CASTILLA LA VIEJA.]

HAROLD I. was the younger of the two sons of Canute the Great, by Alfgiva. [HARDICANUTE.] He died in 1040.

HAROLD II., the second of the sons of Godwin, earl of Kent, who makes his first appearance in political history after the death of Canute, as a supporter, in concert with Queen Emma, of the succession of Hardicanute. [HARDICANUTE.] On Godwin's death his earldom of Kent, which, besides that county, comprehended all Wessex and Sussex, was given to his second son, Harold, Harold's own earldom of East Anglia being transferred to Alfgar, the son of Leofric, styled Earl of Leicester, the potent rival of the Godwin family. This arrangement was not submitted to by Harold: Alfgar was outlawed on a charge of treason which Harold brought against him; on which flying to Ireland he speedily returned with a force of Danes from that country, and of auxiliaries from Wales, to levy war against the king. Harold was despatched by Edward to meet the rebels; but a contest of arms was prevented by a negotiation which restored his earldom to Alfgar, who soon after also succeeded to the honours and estates of his father Leofric, but did not live above a year to enjoy them. Harold meanwhile, as the king's commander-in-chief, turned to chastise the Welsh for the aid they had given to the revolt; and a series of hostilities with that people commenced, which did not finally terminate till 1063. It was about two years after this that Harold was shipwrecked on the coast of Ponthieu, where he was immediately seized by the Earl Guy, and on the demand of William, duke of Normandy, delivered over to that prince. William did not permit his prisoner to embark for England till he had compelled him to take a solemn oath that he would do everything in his power, on the decease of Edward, to promote the duke's succession to the English crown. On the death of Edward the Confessor (5th January, 1066), a report having been circulated that Edward had named Harold for his successor, he was proclaimed king, and next day solemnly crowned, a few hours after the interment of the late king.

For more than half a year Harold was left to occupy the throne. Two foreign enemies however at length assailed him nearly at the same time. His brother Tostig, having formed a confederacy with Harold Hardrada, king of Norway, sailed round at the head of his fleet of sixty vessels to the mouth of the Tyne, where he was joined about the beginning of September by Hardrada with a navy of three hundred sail. The invaders had made themselves masters of the entire province of York before Harold came up. On the 25th, however, he engaged them at Stamford Bridge, on the Derwent, when both Hardrada and Tostig fell, and the English king obtained a complete victory. Only three days after this the Duke of Normandy landed at Bulverhithe, between Pevensey and Hastings, on the southern coast, with a mighty armament, which he had spent eight months in fitting out. Harold did not reach the Norman camp till the 13th of October. On the morning of the following day battle was joined at a place then called Senlac (now Battle), about nine miles from Hastings. The issue of this memorable engagement was the complete defeat of the English, after Harold himself had fallen, pierced through the head by an arrow, his two brothers, Gurth and Leofwine, having also been already slain. This victory gave the crown of England to the Duke of Normandy, by whose descendants it has ever since been worn.

HAROLD'S CROSS. [DUBLIN.]

HARP (*hearp*, Saxon), a musical instrument, which, under different forms and denominations, may be traced to the remotest ages. Martianus Capella found the harp in use among the northern tribes which overran the Roman empire in the fifth century. Jones, the Welsh bard, claims for his country the possession of a harp of twenty-six diatonic notes, so early as the beginning of the sixth century. An ancient Irish harp has been sketched by Bunting, which had in a row forty-five strings, and an additional seven in the centre, as unisons.

The Welsh triple-stringed harp of the present day extends from G an octave below the first line in the base, to G, or A in altissimo on the *right* side; and from G, the first line in the base, to the same upper notes on the *left* side; the middle row consists of the semitones of the outward rows. Hence, if the outside rows be tuned in the diatonic scale of G, each parallel note being in perfect unison, the notes of the middle row are tuned a semitone higher.

The harp, as a generally useful instrument, may be said to date its existence from the time when pedals were added to it, by the invention of Sebastian Erard. With these it is possible to modulate into all keys, and to execute any music suited to keyed instruments. In the *single-action*, the pedals raise every string half a note; in the *double-action*, the instrument is tuned in C flat; and by fixing the pedals in the first groove the instrument is at once transposed into C natural; whereas by fixing them in the second groove it is transposed another semitone higher, into the key of C sharp. The compass of the harp thus improved is from double E below the base to E in altissimo.

HARPA'LIDÆ, an extensive family of coleopterous insects of the section of *Geodephaga*, the species of which are distinguished by the tarsi of the two anterior pairs of legs being dilated in the male sex.

In these insects the tibia of the anterior pair of legs have always a deep notch on the inner side; the head is almost always short and rounded in front; the thorax is generally broader than long, somewhat convex, but slightly narrower behind than before, and nearly equal in width to the elytra. The body usually approaches more or less to a cylindrical form; the elytra are almost always rounded at the apex, and never truncated at this part. They are usually found under stones.

Of the family *Harpalidæ*, Dejean, in his 'Spécies Général des Coléoptères,' enumerates 27 genera: others however have been discovered since the publication of that work. The number of species known is probably upwards of 500.

HARPE, JEAN FRANÇOIS DE LA, was born at Paris in 1739, and educated gratis at the Collège d'Harcourt. An accident, by which he was unjustly convicted of the authorship of some

pasquinades against two of the instructors there, led to his confinement for nine months in the Bastile. Some juvenile poems having met with success, he published a collection of them in 1762.

His poems and dramas made comparatively small impression, excepting 'Warwick,' and his translations from Sophocles. He afterwards published his 'Lycée, ou Cours de la Littérature,' his 'Mémoires Littéraires,' and a satirical work called 'Correspondence Turque.' At the commencement of the Revolution he was a zealous republican; but the imprisonment which he suffered from the democrats changed his politics, and he became a warm defender of the church and the monarchy. He was bold enough at the first sittings of the 'Lycée des Arts' to inveigh against the Terrorists, and he would have suffered from their vengeance if he had not escaped by flight. After the 18th Brumaire (9th November, 1799) he began anew his lectures at the Lycée. Shortly before his death his freedom of speech offended the first consul, and he was banished to Orleans. He returned to Paris soon afterwards, and died in 1803.

HARPOCRA'TION, VALE'RIUS, a Greek rhetorician of Alexandria, wrote a 'Lexicon to the Ten Orators,' which contains an account of many of the persons and facts mentioned in the orations of the ten principal orators of Athens, and also an explanation of many words and phrases in their writings.

The 'Lexicon' was first printed by Aldus in 1503, with the scholia of Ulpian on the Philippic orations of Demosthenes. The work has been also published by Massac, 4to., Paris, 1614, with many notes; Blancard, with a Latin translation, Leyden, 1683, 4to.; Gronovius, 4to., 1696; W. Dindorf, Leip., 1824, 2 vols. 8vo.; Bekker, 8vo., Berlin, 1833.

HARPSICHORD, a keyed musical instrument, in form the same as the grand piano-forte, but smaller, strung with steel and brass wires, two to each note, which are struck by *jacks* armed with small pieces of quill, acting as plectrums, and thus made to render a brilliant but somewhat harsh sound, wholly unlike that produced by the hammers of the piano-forte. *Stops*, *swells*, and double rows of keys were occasionally employed to modify the power of the wires. The harpsichord came into use in England in the seventeenth century; but it is now entirely superseded by the PIANOFORTE.

HARPY EAGLE. [FALCONIDÆ.]

HARQUEBUSS. [ARMS.]

HARRIER, the English name for the hound employed in hunting the hare. The size and breed of the Harrier depend upon the taste of the owner, and that is most frequently regulated by the nature of the country in which the pack is to hunt. Mr. Beckford, a great authority in such cases, says, 'The hounds, I think, most likely to show you sport, are between the large slow-hunting harrier and the little fox-beagle; the former are too dull, too heavy, and too slow; the latter too lively, too light, and too fleet. The first, it is true, have most excellent noses, and, I make no doubt, will kill their game at last if the day be long enough; but you know the days are short in winter, and it is bad hunting in the dark. The other, on the contrary, fling, dash, and are all alive; but every cold blast affects them, and, if your country be deep and wet, it is not impossible that some of them may be drowned. My hounds were a cross of both these kinds, in which it was my endeavour to get as much bone and strength in as small a compass as possible. It was a difficult undertaking. I bred many years, and an infinity of hounds, before I could get what I wanted. I at last had the pleasure to see them very handsome; small, yet very bony; they ran remarkably well together; went fast enough; had all the alacrity that could be desired, and would hunt the coldest scent.'

HARRINGTON. [CUMBERLAND.]

HARRINGTON, JAMES, descended from an ancient and noble family in Rutlandshire, and the eldest son of Sir Sapcotes Harrington, was born in January 1611. At the close of his residence at the University of Oxford, during which his father had died, he set out on a course of travels; and on his return to England principally passed his time in retirement. But in 1646 he was requested by the commissioners whom parliament had appointed to carry King Charles I. from Newcastle nearer to London to wait on his majesty. He complied with the request, and was shortly after made a groom of the bedchamber. On the king's removal from the Isle of Wight to Hurst Castle, Harrington was removed from the king's service, and, on his subsequently refusing to swear that he would not assist or conceal the king's escape, he was placed under arrest, and detained until an application of General Ireton obtained him his liberty. He afterwards showed his attachment to the king by accompanying him to the scaffold.

'After the king's death,' says Mr. Toland, 'he was observed to keep much in his library, and more retired than usually, which was by his friends a long time attributed to melancholy or discontent.' He was engaged however in the composition of his 'Oceana.' And when he had proceeded some way in its composition, making no secret of his views on government and of his partiality towards a commonwealth, he found that he had already brought down upon himself the suspicions both of Cromwell and of the Royalists. His book was seized, while in the press, by Cromwell's order; but Harrington eventually recovered it through the intercession of Lady Claypole, Cromwell's favourite daughter.

The 'Oceana' on its appearance excited great attention. Answers were published, and those Harrington in turn answered. In 1659 Harrington published an abridgment of the 'Oceana,' under the title of the 'Art of Lawgiving;' and subsequently several tracts. He had also founded a club, called the Rota Club, at which he gave nightly discourses on the advantage of a commonwealth and of the ballot. The club was broken up after the Restoration. But the members had become marked men.

On the 28th of December, 1661, he was seized on a charge of having taken part in a conspiracy

to subvert the monarchy and establish a commonwealth. Having received no answer to several petitions, he made application for a Habeas Corpus; and shortly after this had been granted he was removed without previous notice to a rock opposite Plymouth, called St. Nicholas's Island. His confinement soon produced an effect upon his health, and upon petition he was allowed to be removed to Plymouth. Shortly after he became deranged, owing, it is supposed, to a medicine recommended to him for the cure of the scurvy. Lord Bath, the governor of Plymouth, then made intercession with the king, and Harrington was released from imprisonment. On being removed to London, he rallied considerably as regards bodily health, but his mind was never again right. At his advanced age, and in this unsatisfactory state of health, he married. He died of palsy on Sept. 11, 1677.

HARRIOT, THOMAS, an eminent mathematician and astronomer, was born at Oxford in the year 1560. He took his degree of Bachelor of Arts in 1579, and in 1584 he accompanied Sir Walter Raleigh in his expedition to Virginia, where he was employed in surveying and mapping the country, and upon his return to England in 1588 he published his 'Report of the Newfoundland of Virginia, the commodities there found to be raised,' &c. Harriot was introduced by Sir Walter Raleigh to the Earl of Northumberland. This enlightened nobleman received Harriot into his house, and settled on him an annual salary of 300*l.*, which he enjoyed to the time of his death, in July 1621. During his lifetime Harriot was known to the world merely as an eminent algebraist; but, from a paper by Zach in the 'Astronomical Ephemeris' of the Royal Academy of Sciences at Berlin for the year 1788, it appears that he was equally deserving of eminence as an astronomer. Ten years after Harriot's death his algebra, entitled 'Artis Analyticæ Praxis, ad Æquationes Algebraicas nova, expedita, et generali Methoda resolvendas,' was published by his friend Walter Warner.

HARRIS, JOHN, D.D., born about 1667, died September 7, 1719, a voluminous writer, in the list of whose works we find numbers of sermons, treatises on algebra and fluxions, geometry, trigonometry, astronomy, and navigation. He also wrote 'Remarks on some late papers relating to the Universal Deluge and the Nat. Hist. of the Earth;' 'Navigantium atq. Itinerantium Bibliotheca, or a complete collection of Voyages and Travels,' &c., 1705, 2 vols. fol., reprinted with additions and corrections in 1744 and 1764; 'Lexicon Technologicum, or an Universal English Dictionary of the Arts and Sciences, explaining not only the terms of Arts, but the Arts themselves,' 2 vols. fol., 1704–10. From this, says Watt, 'have originated all the other dictionaries of arts and science and cyclopædias that have since appeared;' 'History of Kent,' 2 vols. fol., 1719. Harris was secretary and vice-president of the Royal Society, and possessed considerable church preferment, but was reduced to poverty by neglect of his affairs. He died in want, and was buried at the expense of his friends.

HARRIS, JAMES, born July 20, 1709, was the eldest son of James Harris, Esq., of Salisbury, by the Lady Eliz. Ashley Cooper, sister of Lord Shaftesbury, the author of the 'Characteristics.' He was educated at the grammar-school in his native place, and passed thence to Wadham College, Oxford. In his twenty-fifth year he lost his father, and thereby became independent in fortune. For fourteen years of his life he did little else than study the Greek and Latin authors with the greatest diligence. In 1745 he married the daughter of John Clarke, Esq., of Sandford, near Bridgewater, by whom he had five children. In 1761 he was returned M.P. for Christchurch, which seat he retained till his death. In 1762 he was appointed to the post of a lord of the Admiralty, and next year to that of a lord of the Treasury, which he held for two years, when his party went out of office. In 1774 he became secretary and comptroller to the queen. He died in 1780. The chief work of Harris is his 'Hermes, or a Philosophical Inquiry concerning Language and Universal Grammar,' a work which Lowth characterised as one of the most beautiful pieces of analysis which had appeared since the days of Aristotle.

The real merit of this work of Harris is perhaps best expressed in the following few words from the first sentence of his sensible preface: 'The chief end proposed by the author of this treatise in making it public has been to excite his readers to curiosity and inquiry.' A careful perusal of the treatise cannot fail to make a man think more accurately.

Harris's 'Hermes' was published in 1751. Some years before, he had written three treatises, on Art, on Music, Painting, and Poetry, and on Happiness; and in 1775 he published his 'Philosophical Arrangements,' a part of a large work on the Aristotelian Logic. His last work is called 'Philological Enquiries.'

HARRIS, JAMES. [MALMESBURY.]

HARRISON, JOHN, was born at Faulby, in Yorkshire, in 1693. Harrison early displayed an attachment to mechanical pursuits, and his attention was particularly directed to the improvement of clocks. After many failures and many minor improvements, he at length succeeded in constructing a pendulum, the excellence of which depended on the different degrees in which metals are expanded or contracted by variations of temperature. In 1735 he came to London with a timepiece which he had constructed, to compete for the prizes offered by the government in 1714 in reference to the longitude. After several trials, he produced a chronometer which erred only 5.1 seconds in a voyage from England to Port Royal; this was sufficient to determine the longitude within 18 miles; and, after twenty-two years of struggling and delays, Harrison received the prize of 20,000*l.* in 1767. Harrison introduced many and varied improvements in clocks, chronometers, and watches. He died at his house in Red Lion Square in 1776, in his 83rd year.

HARRISON, THOMAS, generally called 'Harrison of Chester,' although he was not a native of that city, for he was born at Wakefield

in Yorkshire, in 1744. While yet little more than a mere lad, he was sent to Italy, then considered almost the only efficient school for architectural study; and during his stay at Rome, where he remained for several years, he made designs for improving and embellishing the Piazza del Popolo, which obtained for him both a gold and silver medal from Pope Ganganelli; and he was also complimented by being elected a member of the Academy of St. Luke. On his return he executed various public works at Chester, Liverpool, Manchester, Shrewsbury, and also in Scotland. Harrison died at Chester, March 29, 1829.

HARRISON, WILLIAM HENRY, President of the United States, was born in Virginia, Feb. 9, 1773, and was educated at Hampden Sydney College, in Virginia, for the medical profession; but after the death of his father, who was governor of Virginia, he joined a force which was raised to defend the Ohio territory against the Indians; and the next six years of his life were spent in military service. In 1797, this war having been brought to an end, he resigned his commission as lieutenant, and was appointed secretary and *ex-officio* lieutenant-governor of the north-western territory, then comprehending all the country to the north-west of the river Ohio. In 1799 he was elected a member of the territorial government. In 1801 he was appointed governor of Indiana. He greatly distinguished himself both in the war with the Indians under Tecumseh in 1811, and in that with the English in 1812 and 1813. In both these wars he held the rank of a general. In 1816 he was returned to the House of Representatives as one of the members for Ohio. In 1828 he was sent as minister to Columbia; and in 1840 he was elected president; but he died, at the official residence in Washington, on the 4th of April, 1841, being the first president who had died in office.

HARROLD. [Bedfordshire.]

HARROW. [Plough.]

HARROW. [Middlesex.]

HARROWGATE. [Yorkshire.]

HARRY, BLIND, as he was commonly called, or *Henry the Minstrel*, lived towards the close of the 15th century. He was born about the year 1470, according to Wharton. The work for which Blind Harry is celebrated is a poem on the adventures of Wallace.

HARTE, WALTER, was educated at Marlborough School and Oxford. He seems to have been born about 1700, and to have graduated as M.A. in 1730. Harte published 'Poems on Several Occasions, 1727; 'Essay on Satire,' 1730; 'Essay on Reason,' 1735, to which Pope is said to have contributed very considerably; 'Essay on Painting,' date unmentioned; 'The Amaranth,' 1767, his last work. As a poet however, he is not distinguished from other once successful but now forgotten imitators; but he has made a valuable addition to our literature in his 'History of the Life of Gustavus Adolphus,' 2 vols. 4to., 1759; republished in 8vo., corrected and improved, in 1763. Harte left unfinished, in MS., a 'History of the Thirty Years' War.' The account of his life is soon told. He took orders, acquired reputation as a preacher, was appointed Principal of St. Mary Hall, Oxford, and through the interest of Lord Chesterfield, whose son's tutor he had been, canon of Windsor. He died at Bath in 1774.

HARTFORD. [Connecticut.]

HARTLEPOOL. [Durham.]

HARTLEY, DAVID, was born on the 30th of August, 1705, and was the son of a clergyman of Armley in Yorkshire. Having been first educated at a private school, he entered, at fifteen years of age, at Jesus College, Cambridge, and became in time a fellow of that society. Scruples which would not allow him to subscribe the Thirty-Nine Articles prevented him from afterwards entering the church, as had been originally intended; and he applied himself to the medical profession, in which he attained to considerable eminence.

He commenced the composition of the work by means of which he has become universally known, the 'Observations on Man, his Frame, his Duty, and his Expectations,' at the age of twenty-five. The fundamental idea of the work, the possibility of explaining all states of mind by association, was first suggested to him by Mr. Gay's 'Essay on the Fundamental Principle of Virtue or Morality,' prefixed to Law's translation of Archbishop King's 'Origin of Evil.' His work was published in 1748. He lived nine years after the publication.

Dr. Hartley was twice married, and had children by both marriages. He practised medicine successively at Newark, Bury St. Edmund's, in London, and at Bath, where he died on the 25th of August, 1757. He enjoyed through life the friendship of many distinguished literary men. Among these may be mentioned Bishops Law, Butler, Warburton, and Hoadley, Dr. Jortin, Young the poet, and Hooke, the author of the History of Rome.

HARTSHORN, the horn of the *Cervus Elaphus*, the common stag, which has a place in the pharmacopœia because it contains less earthy matter, and more gelatine, than other bones. It is kept in the form of shavings, of which a sufficient quantity boiled in water yields a jelly suitable to convalescents, which may be flavoured with lemon-juice or wine, &c.; but there is no proof that it is superior to jelly made from calves' feet. It is sometimes a useful addition to milk for young children, but it possesses no alkaline properties, and the further addition of a little lime-water is often necessary to fit it for irritable stomachs.

HARTSHORN, SPIRIT OF. [Ammonia.]

HARTSOEKER, NICHOLAS, a natural philosopher, was born at Gouda, in Holland, in 1656, and from his youth showed a taste for the sciences. An accidental circumstance is said to have directed his attention to the construction of optical instruments. Having presented a filament of glass to the flame of a candle, he was surprised to observe that the extremity, when melted, assumed a spherical form, and he immediately conceived the idea of using such spheres as object glasses for microscopes. In 1674 he was sent to pursue the study of theology at Leyden; and subsequently he

went, accompanied by Huyghens, to Paris, where he constructed some object glasses of about 600 feet focal length for telescopes. In 1694 he published his 'Essai de Dioptrique' (Paris, 4to); but, becoming embarrassed in his circumstances, he was obliged two years afterwards to quit Paris. He retired to Rotterdam, where he published his 'Principes de Physique,' and thence he removed to Amsterdam.

The Elector Palatine having repeatedly offered Hartsoeker the place of professor of mathematics and philosophy at Düsseldorf, he at length accepted it, and in the year 1704 he went to reside in that city. While he held this post he made several journeys to different parts of Germany, in order to visit the learned men of the country. On his return to Düsseldorf he caused three burning-lenses similar to those of Tschirnhausen to be made. On the death of the Elector Palatine, he retired to Utrecht, where he died, in 1725. He had been admitted a foreign associate of the Académie des Sciences of Paris in 1699; and he was also a member of the Academy of Berlin.

HARUN-AL-RASHID. [ABBASIDES.]

HARTZ. [GERMANY.]

HARUSPICES, a class of priests in ancient Rome, whose principal duty was to inspect the entrails of victims, and thereby foretel future events. They also interpreted various phenomena, such as lightning and earthquakes. This art, called *Haruspicina*, was derived from Etruria.

HARVEST. In southern countries, where the heat and want of moisture are not too great for the growth of corn, the only care of the farmer, as to harvest, is to procure hands sufficient to reap it. The heat of the sun and air soon dry the straw and harden the grain. A spot is levelled in the field, and the corn is thrashed out immediately, either by the tread of cattle driven over it or by the flails of numerous thrashers. The corn is winnowed and stored in granaries; and the straw is reserved till winter, when it forms the chief fodder of horses and cattle. But in northern climates, where the harvest is later, and cold rains and storms are frequent in autumn, the ingenuity is often taxed to save the corn, after it has been cut, from being entirely spoiled.

It was long the custom through the whole of the north of Europe to store all the produce of the farm into barns; but on the best farms the corn is now stacked in the open air, at some distance from the ground, and covered with thatch. Formerly corn was so cut as to leave much of the straw standing on the ground; but modern farming is so conducted, that the straw is cut as near the ground as possible. In many places it is not usual to tie up any corn into sheaves, except rye, wheat, and beans. Barley and oats are usually mown, raked into heaps, and carried into the stack or barn when dry, like hay; but this is a slovenly practice, which should not be recommended. With good tillage and proper manuring, the straw of barley and oats will be strong, and of sufficient length to require being tied up into sheaves; and much less of the grain is shaken out and lost in this way than by the usual method.

In rainy seasons it frequently happens that the sheaves remain a long time on the field before they are sufficiently dry to be carried and stacked. If the ears are not secured from the wet, they become soaked, and the grain sprouts in the ear. This is a great loss; for sprouted grain is very inferior, and can only be sold at a low price. A little attention will often prevent the bad effect of rains.

When the stack is building, the butts of the sheaves are placed outwards, and project gradually over the sides of the frame, and over one another, so as to build the stack in the form of a bowl, with a cone or pyramid over it, according as the frame is round or square; this is carefully thatched with straw, and the outer surface is cut smooth by means of shears. Various other forms of stack-building are adopted in different countries.

HARVEY, WILLIAM, was born at Folkestone, in Kent, April 1, 1578, and, after having been some years at the grammar-school of Canterbury, was admitted at Caius College, Cambridge, in the year 1593, being then in his sixteenth year. Having devoted himself to the study of logic and natural philosophy for six years in that university, he removed to Padua, at that time a celebrated school of medicine, where he attended the lectures of Fabricius ab Aquapendente on anatomy, of Minadous on pharmacy, and of Casserius on surgery. He was admitted doctor of medicine there, and returned home at the age of twenty-four. At thirty he was elected fellow of the College of Physicians, and shortly after appointed physician to St. Bartholomew's Hospital. On the 4th of August, 1615, he was chosen by the College to deliver the Lumleian lectures on anatomy and surgery, and upon this occasion he is supposed to have first brought forward his views upon the circulation of the blood, which he afterwards more fully established, and published in 1628.

Before the time of Harvey the opinions on the circulation were numerous and inconsistent. The blood was supposed to be distributed to the various parts of the body by means of the veins, and that intended for the nutrition of the lungs by the action of the right side of the heart. According to the same doctrines the arteries were destined for the conveyance of the vital spirits, which were formed in the left side of the heart from the air and blood derived from the lungs. These vital spirits were supposed to be taken in by the arteries during their diastole, and distributed by them during their systole, whilst the vapours or fuligines, as they are called by Harvey, were returned to the lungs by the action of the left ventricle. Opinions did not agree upon the mode in which the blood found its way to the left side of the heart, for, whilst some supposed that it was conveyed with the air from the lungs, others maintained that it transuded by certain imaginary pores in the septum between the ventricles. These opinions, it is evident, rested more upon imagination than any careful observation of facts. Those of Harvey, on the contrary, were drawn from the most accurate dissections of dead and living animals, and supported by arguments depending entirely upon the anatomical structure and obvious uses of the parts. The result of these

observations is thus stated by him. The heart has periods of action and of rest, but in warm-blooded animals its motions are so rapid, that the different steps of them cannot be distinguished. In cold-blooded animals they are more slow, and in warm-blooded also, after the examination of its action, by opening the chest of a living animal, has been continued some time. During its action the heart is raised, and its point tilted forward so as to strike against the parietes of the chest. It contracts in every direction, but more especially on its sides; it also becomes harder, as other muscles do during their contraction. In fishes and cold-blooded animals the heart may be observed to become paler during its systole, and assume a darker colour during its diastole. If a wound be made in the ventricle, the blood is ejected from it during its contraction. From these facts Harvey concluded that the essential action of the heart is its systole, and not its diastole, as was supposed by physicians before his time, and that the result of this contraction is the expulsion of the blood into the pulmonary artery and aorta. The diastole of the arteries or pulse is synchronous with and caused by the propulsion of the blood during the systole of the ventricle, and is a passive, and not, as was previously supposed, an active operation of the vessels. If the motions of the heart be carefully observed for some minutes, it will be seen first that the two auricles contract simultaneously, and force the blood contained in them into the ventricles; and, secondly, that the ventricles in their turn assume the same action, and propel most of the blood into the pulmonary artery and aorta, from which it is prevented from returning by the valves situated at the entrance of those vessels. He then describes the manner in which the blood passes from the right to the left side of the heart, showing how it first passes through the lungs, and passes to the left auricle and from thence to the left ventricle. In like manner he showed that the blood is propelled from the left ventricle into the arteries and so distributed to all parts of the body. He next proceeded to give approximate calculations of the quantity of blood which passes from the veins through the heart in a given time. This he showed to be so much more than is required for the nutrition, or can be supplied to the veins by the absorption of alimentary substances, that the surplus must of necessity return through the various tissues of the body to the veins again. He then argued from the construction of the valves of the veins that the course of the blood in them must be from the smaller to the larger divisions, and thus to the heart again.

Such is a brief abstract of the principal steps in this the greatest and most original discovery in physiology, which was so directly opposed to all the previous notions of physicians, that its author observed, that he feared injury to himself from the envy of some, or that he should make enemies of all. Harvey afterwards complained to one of his friends, that his practice fell off considerably after the publication of his treatise 'On the Circulation of the Blood,' and it is well known that the doctrine was not received by any physician who was more than 40 years old. He subsequently published a volume entitled 'Exercitationes de Generatione,' which contain a description of the organs of generation in the common fowl, of the formation of the egg and its extrusion from the body, and of the use and nature of its various parts, as well as the changes which it undergoes during the process of incubation.

In the same treatise are also some valuable observations on the process of generation in mammalia, which were confined chiefly to the deer species, of which he was enabled to obtain numerous specimens by the liberality of Charles I., who allowed him to take them from the royal parks.

In 1623 Harvey was appointed physician extraordinary to James I., with a promise of succeeding on the first vacancy to the physicianship in ordinary, the duties of which he actually performed. He was afterwards physician to Charles I., and was in the habit of exhibiting to him and to the most enlightened persons of his court the motion of the heart and the other phenomena upon which his doctrines were founded. During the civil war he travelled with the king, and while staying for a short time in Oxford was made by him master of Merton College, and received the degree of Doctor of Medicine. He held the mastership however for only a few months, when Brent, who had been expelled by the king for favouring the parliamentary cause, was replaced by that party, which had now gained the ascendancy. Soon after, his house was plundered and burned by the same party, and unfortunately several unpublished works, of which we have only notices in his other writings, were destroyed. The latter years of his life were chiefly spent at his country-house at Lambeth, or at his brother's near Richmond. In 1654 he was elected president of the College of Physicians, but in consequence of his age and infirmities he was induced to decline that honourable office. But he testified his regard for the society by presenting them with his library, and conveying over to them, during his lifetime, a farm which had been left him by his father. He died on the 3rd of June, 1657, in the 80th year of his age, and was buried at Hempstead in Essex, where a monument was erected to his memory. The best edition of his works, which were written in correct and elegant Latin, is that published by the College of Physicians in 1 vol. 4to., in 1766, with an engraving by Hall from the portrait by Cornelius Jansen, in the college library. A life of Harvey by D. Willis, and a translation of his works, have also been published by the Sydenham Society.

HARWICH. [Essex.]

HARWOOD, EDWARD, a biblical and classical scholar of the last century, was born in Lancashire, in 1729, and educated as a dissenting minister. He finally accepted the charge of a congregation at Bristol, in 1765, which however, at the end of five years, he was obliged to quit, in consequence of reports (unfounded it is said) touching his religious opinions. He then removed to London, devoted the rest of his life to private tuition and literary labour, and died in distress, Jan. 14, 1794. His reputation as a scholar rests

chiefly on his 'View of the various Editions of the Greek and Roman Classics,' 1775, fourth and best edition, 1790. A list of his numerous works is printed in Watt's *Bibliotheca Britannica*. Dr. Harwood also published a New Translation of the New Testament, 1768.

HASDRUBAL, the name of several Carthaginians.

1. Hasdrubal, the son-in-law of Hamilcar. [HAMILCAR.]

2. Hasdrubal, the son of Hamilcar and brother of Hannibal. [HANNIBAL.]

3. Hasdrubal, who commanded the Carthaginians in their last war against the Romans, B.C. 146.

HASLINGDEN. [LANCASHIRE.]

HASSE, JOHANN ADOLPH, was born at Bergedorf, near Hamburg, March 25, 1699. When very young, he distinguished himself as a superior tenor singer, but soon left Germany for Italy, and became first the disciple of Porpora, then of Alessandro Scarlatti. He visited Naples, London, Dresden, Vienna, Venice, and other cities, in succession, and produced 'Sesostrate,' 'Artaserse,' 'Armenio,' and several other operas, together with a 'Te Deum,' a 'Requiem,' and various other sacred pieces. His works were much admired in his own day, but are seldom performed now. Hasse died at Venice Dec. 23, 1783.

HASSELQUIST, FREDRIK, was born at Törnvalla, in East Gothland, on the 3rd January, 1722, old style. His father, Andrew Hasselquist, a poor curate, having died young, without having made any provision for his family, his wife's brother, a clergyman of the name of Pontin, took charge of young Hasselquist's education, and placed him with his own children in the school of Linköping. After the death of his benefactor, Hasselquist was transferred to the university of Upsal, where he entered in 1741. He there acquired a taste for natural history, became a pupil of the great Linnæus, and was led very particularly to apply himself to the study of the properties of plants. An inaugural thesis, called 'Vires Plantarum,' which appeared in 1747, evinced him to be a young man of a strong original turn of mind, and worthy of his master. In 1749 he visited the Holy Land for the laudable purpose of investigating its natural history. Having sailed from Stockholm in August, he proceeded to Smyrna, thence to Egypt, and afterwards to the Holy Land. His constitution sunk however under the exertions of his enterprising spirit, and he died at Smyrna, on his return homewards, on the 9th February, 1752, in the 31st year of his age. The result of his investigations of these at that time little known countries was given to the world by Linnæus in the year 1757, under the name of 'Iter Palæstinum.' This work showed that the author had combined with energy and industry great attainments in the sciences of his day.

HASSELQUISTIA, a genus of plants belonging to the natural order *Umbelliferæ*, and to the tribe *Tordylineæ*. The species closely resemble those of *Tordylium*, and are regarded by some botanists as monstrous forms of this genus.

HASSELT. [LIMBURG.]

HASTINGS. [SUSSEX.]

HASTINGS, WARREN, was born in the rank of middle life in 1733, and, after receiving the usual education at Westminster School, went out in 1750 as a writer in the service of the East India Company. After residing about fourteen years in India, he returned home with a moderate fortune. In 1769 he received the appointment of second in council at Madras, and in 1772 was appointed President of the Supreme Council of Bengal. His powers were enlarged by the alteration of the Indian constitution by act of parliament, in virtue of which he became, January 1, 1774, governor-general and supreme head of all our Indian dependencies. Affairs were at this time in great disorder, but he weathered the dangers to which the British Empire in India was exposed. Notwithstanding his services, he gave satisfaction neither to the home administration nor to the Court of Directors. The public ear was offended by rumours of cruelty, corruption, and unjust aggression; the Directors censured the lavish and corrupt expenditure, and the independence of his conduct. Repeated attempts were made to obtain his dismissal, but these were uniformly defeated by the Court of Proprietors. Thus supported, he carried matters with a high hand; neglected or positively refused to obey the orders sent by the Directors; overruled the opposition of the Council, of which a majority was, in the first instance, opposed to his views [FRANCIS, SIR PHILIP]; and practically exercised an absolute and irresponsible power until February 1785, when he resigned his office and set sail for England, well aware that a storm awaited his arrival. In the session of 1786, articles of impeachment were brought forward by Mr. Burke, charging him with the oppression and final expulsion of the raja of Benares; the mal-treatment and robbery of the Begums (or princesses) of the house of Oude; and the charges of receiving presents and conniving at unfair contracts and extravagant expenditure. The sessions of 1786–7 having been consumed in preliminary proceedings, the House of Lords assembled in Westminster Hall, February 13th, 1788, to try the impeachment, and on the 15th, Mr. Burke, in the name of the Commons of England, opened the charges against the prisoner in a speech which lasted upwards of three days. [BURKE.] He was assisted in the management of this cause by Fox, Sheridan, Grey and others. The sessions of 1788, 1789, and 179[illegible] were consumed in going through the case for the prosecution. In 1791 the Commons expressed their willingness to abandon some part of the charges, with the view of bringing the trial soone to an end; and on the 2nd of June, the seventy third day, Mr. Hastings began his defence. Th was protracted until April 17, 1795, on whic (the 148th) day he was acquitted by a large maj rity on every separate article charged against hi

Mr. Hastings attempted to refute the charg of extortion by publicly asserting, in the mo solemn manner, that never at any time of his l was he worth 100,000*l*. The law-charges of h defence amounted to 76,080*l*. In March 179

the Company granted him an annuity of 4000*l.* for twenty-eight years and a half, and lent him 50,000*l.* for eighteen years, free of interest. He retired completely from public life, to an estate which he purchased at Daylesford, in Worcestershire. He died August 22nd, 1818, having been raised to the dignity of privy-councillor not long before.

HAT. The hats used in this country are mostly made of straw, wool and fur, or silk. The first are noticed under STRAW PLAIT. Beaver hats of the finest quality are made with lamb's wool, and the fur of English rabbits. To form the body of the hat, the wool and rabbit's-fur are separately *bowed* in the manner employed for freeing cotton from its seeds. The two substances are next bowed together until they are intimately mixed, after which the mass is spread evenly, covered with an oil-cloth, and pressed to the state of an imperfectly tangled felt. The next process is to cover the felt with a triangular piece of damp brown paper, and then to fold it in a damp cloth and work it well with the hand, pressing and bending, rolling and unrolling it, until the interlacing or felting is much more perfect, and the mass is compact. The felt thus prepared is next taken to the wide brim of a boiler charged with hot water and beer-grounds and a small quantity of sulphuric acid; it is wetted, rubbed, and rolled, until it no longer contracts. The felt is next stiffened with shell-lac, a solution of which is applied by means of a brush to one side, and sometimes to both sides of the felt, after which it is stoved, and by this means the whole substance becomes duly impregnated with the resin: this renders the hat nearly water-proof. To form the nap of a hat, one-half or three-fourths of an ounce of beaver, and some other less costly fur, are bowed together and imperfectly felted in the manner already described, and shaped the same as the body to which it is to be applied; that body is then softened by immersing it in the boiler, when the nap is applied and worked as in felting, until the required union is effected between the two bodies.

The felt thus covered is brought to the proper shape by working it on a wooden block, and is then dyed black. The hat is softened by steam, the crown is strengthened by placing in it a disc of scale-board, and linen is pasted over this. The nap is raised, and a uniform direction given to its fibres by means of warm irons and hair brushes. The last processes are binding and lining, when the hat is ready to be worn. In the low-priced hats of the present day, commoner wool and fur, and smaller quantities of each, are used.

Silk hats consist of a cover or exterior part made of silk plush, which is laid upon a foundation of chip, stiffened linen, or some other light material, previously blocked into shape.

11,444 dozens of hats were exported in 1846, nearly all to British colonies. The exports used to be larger.

HATCHETINE. *Mineral Adipocire.* This substance occurs in thin flakes in the cavities of the ironstone of South Wales. It is very soft, somewhat granular in appearance; translucent; colour yellowish white or greenish; not elastic; inodorous; combustible. It melts at 170°, and is soluble in ether. It consists of C^{1} H^{1}.

HATHERLEIGH. [DEVONSHIRE.]

HAUBERGEON, or HAUBERK. [ARMOUR.]

HAUGHTON, WILLIAM, a dramatic writer, was probably somewhat the junior of Shakspere. In Henslowe's Diary, under the date of November 1597, he is called 'Young Haughton:' and his name occurs frequently in that curious record till the end of the year 1600, but not later. He wrote several plays unassisted; in others his coadjutors were Chettle, Day, and still more frequently Dekker. In 1600 there was licensed a tragedy of his, not preserved, called 'Ferrex and Porrex;' and Mr. Collier has conjectured that Haughton's 'Devil and his Dam,' described as in progress about the same time, may have been an alteration of 'Grim, the Collier of Croydon.' But the only extant plays in which Haughton was certainly concerned are two. 1. He was sole author of the lively comedy called 'Englishmen for My Money; or, a Woman will have her Will,' which (under the latter title) appears in Henslowe's book in 1598. It was printed in 1616, in 1626, and 1631, and has been reprinted in a small collection called 'The Old English Drama,' 1830, 4 vols. 12mo. 2. Dekker, Haughton, and Chettle were jointly the authors of 'The Pleasant Comedie of Patient Grissill,' entered at Stationers' Hall in March 1600, printed in 1603, and reprinted from a very rare copy by the Shakespeare Society in 1841.

HAUKAL, ABUL KASEM MOHAMMED IBN, a celebrated Arabic traveller and geographer. The few particulars we possess concerning his life are derived from his own work. Partly to avoid the tyranny of the reigning sultan, and to improve his own fortune by trade, he set out from Bagdad, A.H. 331 (A.D. 94–23), to visit foreign countries. He does not tell us into what countries he travelled; but we learn from his own account that he was in Mesopotamia A.H. 358 (A.D. 968–9); in Africa, A.H. 360 (A.D. 970–1); in Sicily, A.H. 362 (A.D. 972–3); and in Mecca, A.H. 364 or 5 (A.D. 974–5 or 975–6).

Haukal's work on geography is entitled 'A Book of Roads and Kingdoms.' The description of each country is accompanied by a map.

Manuscripts of Haukal's work on geography are rarely met with even in the East. There is a copy in the Bodleian Library at Oxford, and another at Leyden. From the latter MS. Uylenbroeck has given an interesting account of the work in his 'Iracæ Persicæ Descriptio: præmissa est Dissertatio de Ibn Haukali Geographi codice Lugduno-Batavo,' 4to., Lug. Bat. 1822.

Ouseley published, from what he conceived to be a Persian translation of the Arabic of Haukal, a work entitled 'The Oriental Geography of Ebn Haukal, a traveller of the 10th century,' Lond. 1800; and De Sacy gave a further account of this work in the 'Magasin Encyclopédique,' vol. vi. pp. 32-76, 151–186, 307-333. But Uylenbroeck has shown, that the Persian treatise translated by Ouseley cannot be regarded as either a translation or an abridgment of the Arabic of Haukal. He considers it probable that the Per-

sian work was one of those which Haukal made use of in compiling his Geography, and that it was written by Ibn Khordadbeh.

HAUKSBEE, or HAWKSBEE, FRANCIS, was born in the latter part of the 17th century. He was admitted a fellow of the Royal Society in 1705, and between 1705-11 there appeared several papers in the 'Philosophical Transactions,' giving an account of his experiments in electricity. In 1706 he recognised the electricity of glass by friction, and was thence led to the construction of the electrical machine. In 1709 he published his 'Physico-Mechanical Experiments on various Subjects, touching Light and Electricity producible on the Attrition of Bodies,' London, 4to.; and in 1731, 'Proposals for a Course of Chemical Experiments,' 4to. In the same year he published 'An Essay for introducing a Portable Laboratory.'

HAUTBOIS. [Oboe.]

HAUTEFEUILLE, JEAN DE, a French mechanician, was born at Orleans, March 20, 1647. His father was a baker, but the Duchess of Bouillon, to whom the young man was introduced, paid the expense of his education, and engaged him to enter into the ecclesiastical state.

The Abbé Hautefeuille devoted himself to the study of subjects connected with physical science, and to the construction or improvement of instruments; but he is distinguished chiefly by the claims which he advanced, in 1675, to the honour of having invented a spring-balance for watches. About the same time Huyghens invented, for the like purpose, a spring, which he made of a spiral form; and it is remarkable that Dr. Hooke had, about the year 1658, invented a balance-spring for watches, but he spent several years in improving his escapement, and his watches were not made public till about the same year that the inventions of Hautefeuille and Huyghens were in use in Paris.

Hautefeuille published a method of finding the declination of a magnetic needle (1683); an account of a magnetic balance (1702); with accounts of a micrometical microscope, and of an instrument for observing the altitudes of celestial bodies. He also published, in 1719, a work entitled 'Nouveau Systême du Flux et Reflux de la Mer,' in which the phenomena of the tides are made to depend upon a particular motion which he ascribes to the earth: but the best of his works is his 'Dissertation sur la Cause de l'Echo,' which had been read before the Academy of Bordeaux in 1718, and was published in that city in 1741. He died October 18, 1724.

HAÜY, RENE'-JUST, ABBE', was born 1743, at St. Just, in the present department of Oise. He commenced his studies at the college of Navarre, to which college he was appointed professor in 1764, and subsequently also to that of the Cardinal Le Moine. He was the first to show that the structure of crystalline substances was regulated by laws as invariable as those to which organised bodies are subjected. His theory rests upon the supposition that all the crystalline forms belonging to any single species of mineral are derivable from some one simple form which may be regarded as the type of the species. He received many scientific appointments in France. He died at Paris, June 3, 1822. Besides numerous memoirs upon mineralogy and electricity, inserted in the 'Journal des Mines' and the 'Annals of the Museum of Natural History,' he has left the following works: 'An Essay on the Structure of Crystals,' 1 vol., 1784; 'Exposition of the Theory of Electricity and Magnetism,' 1 vol.; 'Treatise on Mineralogy,' 4 vols., 1822; 'Treatise on Physics,' 2 vols., 1821; 'Treatise on Crystallography,' 2 vols., 1822; and some others.

HAÜYNE. *Latialite.* This mineral occurs in rhombic dodecahedral crystals, of a blueish green colour. The massive varieties are amorphous; structure granular, compact. The composition is complex, but consists chiefly of silica, alumina, potash, lime, and sulphuric acid.

HAVANNAH (*Habaña*), a flourishing commercial town, with the best harbour in the West Indies, or perhaps in the world, stands on the north coast of the island of Cuba, in 23° 8′ 15″ N. lat., 82° 22′ 5″ W. long., and has a population, including the garrison, of 150,000, about 25,000 of whom are slaves, and the remainder whites and free blacks, in the ratio of 2 to 1. A channel half a mile long, 350 yards broad, 8 to 10 fathoms deep, and without bar or obstruction of any sort, leads to the harbour, which is formed by a magnificent bay nearly 3 miles long, and half as much in width, sheltered by hills from every wind, and capable of accommodating 1000 ships of the largest size, vessels of the greatest draught coming close up to the quays. The city is built along the entrance to and on the west side of the basin. In the city the streets are narrow and dirty, but in the suburbs, which are now larger than the city, they are wide and well laid out. Of late years too, all parts of the town are much improved in cleanliness, and less unhealthy in summer than formerly. The entrance to the harbour is defended by two strong fortresses, El Morro and La Punta, and a continuous series of batteries runs along both shores. The city also, which is entered by 3 gates, is defended by a strong citadel; and fortifications have been erected on all the neighbouring heights. In general the houses are of only one story, but of very solid construction; the windows are unglazed, and always kept open on account of the heat of the climate. Among the finest public buildings are the cathedral (in which the remains of Columbus now lie, having been removed hither from San-Domingo in 1795) and 11 other churches. Other large structures, more remarkable for solidity than elegance, are the two hospitals, the residence of the Captain-General near the citadel, the naval arsenal, the post-office (correo), and the great tobacco factories. Havannah is the seat of a bishop, has a university, an ecclesiastical college, a theatre, a botanic garden, a circus for bull-fights, and three fine promenades, one along the ramparts, one within the town, and a third without the walls (Passeo Extra-Muros).

A glance at the map shows the great importance of Havannah in a political point of view, commanding as it does both the inlets to the Gulf of

Mexico. Among the commercial cities of the western hemisphere it ranks inferior only to New York, and for a long period it engrossed the whole foreign trade of Cuba; but since 1809, when the old colonial system of Spain was relaxed, *Matanzas*, a town of about 20,000 inhabitants, and 60 miles E. from Havannah, has obtained a considerable amount of the commerce of Cuba. The principal articles of export from both ports are sugar, copper ore, coffee, raw tobacco and cigars of the best quality, molasses, and the precious metals; other exports are mahogany, cedar, rum, cocoa, cotton, wax, hides, fruits and preserves, honey, dye-stuffs, &c. The number of ships which cleared out of the harbour of Havannah in 1842 was 1419, with 246,023 tons of merchandise valued at 13,118,585 Spanish dollars (4*s*. 6*d*. each). From Matanzas in the same year 417 ships cleared with 80,750 tons of goods, valued at 4,365,926 dollars. Of coffee Havannah exported 18,454,601 lbs. in 1841, and 25,788,105 lbs. in 1842; from Matanzas the quantities were 2,752,311 lbs., and 4,104,925 lbs. in those two years. The total quantity of sugar exported in 1841 and 1842 respectively from Havannah was 434,464, and 415,465 boxes; from Matanzas, 261,927 and 260,766 boxes of 400 lbs. each. Since then however, in consequence of the relaxation of the English tariff in 1842, and of the sugar act of 1846, the exports are said to have greatly increased, and this is in part proved by the quantity of sugar exported in 1847, which from the two ports amounted to 1,004,496 boxes.

The number of vessels that entered the port of Havannah in 1842 was 1410, with 246,023 tons of foreign produce to the value of 18,801,913 dollars. The imports are composed of flour, corn, provisions, cotton goods, wine, linen, hardware and metals, silk, gold and silver from Mexico, spices, leather, butter, lard, cheese, fish, deals, casks, hoops, &c. The trade of Havannah extends to all countries of Europe and America, but chiefly to Spain, the United States, and England.

(M'Culloch's *Commercial Dictionary;* Macgregor's *Statistics;* Humboldt's *Essai Politique sur l'Isle de Cuba.*)

HAVANT. [Hampshire.]

HAVERCAMP, SIGEBERT, was born at Utrecht, A.D. 1683. He studied philology at Leyden under Gronovius, whom he succeeded as professor of Greek. He was also appointed afterwards professor of history and eloquence. He died on the 25th of April, 1742, in the 60th year of his age.

He edited many of the ancient authors, with numerous notes, among which is an edition of Josephus, 2 vols. fol., Amst., 1726. He was also the author of many original works, of which the most important is 'A Universal History,' fol., 1736, in Dutch.

HAVERFORDWEST. [Pembrokeshire.]

HAVRE or, HAVRE-DE-GRACE, LE, a large commercial town and fortified seaport in the department of Seine Inferieure in France, stands in a low marshy spot on the southern shore of the English Channel, at the embouchure and on the right bank of the Seine, in 49° 29′ N. lat., 0° 6′ 33″ E. long., at a distance by railway of 142 miles N.W. from Paris, 87 W. by N. from Rouen, and has 27,154 inhabitants. On the decline of Harfleur in the latter half of the 15th century, and the blocking-up of its port by the sandy deposits of the Seine, the importance was seen of having a safe resort for the French navy, and, above all, of blocking up the gate of the Seine through which the English had so often penetrated into the heart of France. Accordingly, on a spot where then stood a fishing village with a humble thatched chapel dedicated to Notre-Dame-de-Grace, Louis XII. in 1509 laid the foundation of Havre, threw up some fortifications, and built two short jetties. His successor François I., by the sums he expended on the town, and the great privileges he conferred upon it, is however to be looked on as the true founder of Havre. In this reign the new city was in great measure built, the harbours improved, the town-hall and the ramparts erected, and the Tower of François I., which still subsists, constructed for the defence of the harbour. In 1562 the Prince de Condé betrayed the town to Queen Elizabeth, who garrisoned it with 6000 troops under Dudley, earl of Warwick. The English were forced to capitulate in 1563, but carried away as a memorial of their occupation the archives of the town, which are now deposited in the Tower of London. Louis XIII. added to the fortifications, and built a citadel, which was afterwards rebuilt on a new plan by order of Cardinal Richelieu. Under Louis XIV. the extent of the town was nearly doubled; part of the fortifications and the old gate of Ingouville were demolished, a new quarter built, and the citadel converted into an immense military quarter, which comprises an arsenal, governor's residence, ammunition stores, and large barracks, forming together a spacious and handsome square round the Place d'Armes. The modern fortifications, which are only a nuisance from the obstruction they present to the extension of the town, consist of ramparts and three wet ditches. The ramparts are surmounted by a parapet, and part of them is planted with fine trees.

The town is entered by 5 gates with drawbridges; of these gates the Porte-Royale, in form of a triumphal arch, is the most remarkable. The old part of the town, which is built round the harbour, presents regular but narrow streets. The wooden houses, of which it was formerly composed, are gradually giving way to more solid and more sightly structures. The new part is built on a regular plan; the streets are wide, cross each other at right angles, and present several handsome houses. The principal street in Havre is the Rue de Paris, which presents more commercial activity than is seen even in Paris. There are few buildings that call for special notice; besides those already mentioned may be named the church of Notre-Dame, the custom-house, the exchange, the great tobacco factory on the Quay d'Orléans, the bonding warehouses, the public library, which contains 15,000 volumes, the theatre, burnt down in 1843 and rebuilt in 1844, and the Frascati baths on the sea-shore. Tribunals of first instance and of commerce are held in the town, which has also

a chamber of commerce, a naval school of the first class, several insurance offices, &c. Foreign consuls reside in Havre.

The harbour consists of three wet docks, and an outer port, separated by locks, and capable of containing 450 ships. A fourth dock is in course of formation for steamers, which on account of the narow entrance cannot enter the old docks, and now lie in the outer harbour. A narrow channel, which is formed by two long jetties running nearly E. and W., and built between two banks of shingle, leads from the outer harbour into the embouchure, whence, by two passages between sand-banks, two roadsteads are reached; in these there is always deep water and good holding ground, but no shelter. At low water, when the outer port and the channel are dry, the water from a large reservoir, which is kept open till full tide and then closed by floodgates, is discharged to sweep away the sandy deposits which would otherwise soon block up the harbour. A singular local phenomenon respecting the tide, which rises at Havre to 20 and 27 feet, gives an important advantage to the harbour. It results from the position of the harbour with respect to the Seine that the tide having reached its maximum continues *full for three hours* in consequence of the strong current of the river damming up the water in the channel formed by the jetties; and this exception to the general tidal law gives vessels leaving the harbour time to reach the sea, even against a head wind in a single tide. The fine quays which border the docks are always lined with vessels, and present great activity of business.

The trade of Havre produces in ordinary years customs duties amounting to about a million sterling, representing a total movement of merchandise to the value of over 20,000,000*l*. Besides vast quantities of foreign and colonial produce for the supply of Paris and the north of France, such as coffee, sugar, spices, the imports consist of raw cotton for the manufacturing districts of Rouen, St. Quentin, &c., of indigo, dyewoods, tobacco, rice, hides, timber, iron, tin, tea, &c. The principal exports are silks, broadcloth, cotton manufactures, lace, gloves, shoes, trinkets, plated and tin wares, perfumery, wine, brandy, glass, furniture, books, &c. In 1842 there entered the harbour 607 ships of 221,000 tons' burden from ports out of Europe. In the cabotage or coasting-trade, which includes all European and Mediterranean ports, there entered in the same year 5863 vessels of all kinds, with a burthen of 744,000 tons. The departures in the same year amounted to 539 foreign ships and 5406 coasters, with respective burdens of 201,000 and 798,000 tons. Above 450 vessels belong to the port, including 50 of 400 to 500 tons engaged in the whale fishery, and 40 large and small steamers. There is regular communication by powerful steamers with Rouen, London, Southampton, Bayonne, Hamburg, Lisbon, &c., and by packet ships with New York, Bahia, Vera Cruz, New Orleans. Small steamers ply to Honfleur, Caen, Rouen, and Paris. On Cape La-Hève, which is 2 miles N.N.W. of the town and rises to the height of 390 feet above the sea, there are two lighthouses 325 feet apart and 50 feet high, with powerful fixed lights. There is also a brilliar harbour light on the extremity of the western jetty

The manufactures of Havre are composed vitriol, pottery, lace, paper, oil, carpenters' tool bricks and tiles, ship cordage, tobacco, furnitur &c. There are also several sugar refineries, an breweries. Outside the town and close to th shore there are five shipbuilding yards, which hav constructed some of the best sailing vessels an swiftest steamers belonging to France.

Separated from Havre only by the fortification is the handsome suburb of *Ingouville*, which built on a high hill overlooking the town, th harbour, and the sea, and containing many pretty country seats belonging to the merchants of th town. It has 9888 inhabitants, many of whom are engaged in manufactures. Havre itself lies o low ground, and has often suffered from the sea i violent hurricanes.

(*Dictionnaire de la France;* Macgregor's *Commercial Statistics;* McCulloch's *Commercial Dictionary.*)

HAWES, STEPHEN, author of 'The Pas time of Pleasure,' lived at the beginning of th sixteenth century, but the date of his birth an death are alike uncertain. His accomplishment made him a favourite with Henry VII., who ha some taste in literature.

His 'Pastime of Pleasure' is an allegorical poem 'containing the knowledge of the seven science and the course of Man's life in this world.'

Another poem, 'The Temple of Glas,' is a cribed to Hawes, but there are almost equall strong reasons for believing it to be Lydgate's.

HAWFINCH, *Haw Grosbeak*, *Grosbeak* of th English; *Le Grosbek* and *Pinson Royal* of th French; *Frogione, Froccione, Frosone, Frison Friggione*, of the Italians; *Kernbeisser, Kirsc Kernbeisser, Kirschfink, Nussbeisser* of the Ge mans; *Loxia Coccothraustes* of Linnæus; *Fri gilla Coccothraustes* of Temminck; *Coccothraust vulgaris* of Brisson.

Description.—Rump, head, and cheeks re brown; edging round the bill, space between th and the eye, a line beyond the eye and thro deep black; a large ash-coloured collar just belo the nape; back and greater part of the wir deep brown, but there is an oblique white str upon the wing, and beyond it a considerable spa

Hawfinch (*Coccothraustes vulgaris*).

of a light whitish colour going off into chesnut; secondary quills as if cut off square at the ends, or, as Edwards says, with justice, like the figures of some of the ancient battle-axes, glossed with rich blue, less conspicuous in the female; tail feathers white within, of a blackish brown on the external barbs; lower parts of the bird vinous red; iris pale red (according to Temminck), feet and bill grayish brown. Length seven inches.

Female, generally like the male, but with the colours much less brilliant.

The young of the year before the moult are very different in their plumage from the adult birds. Throat yellow; face, cheeks, and summit of the head dirty yellowish; lower parts white, or whitish; sides marked with small brown streaks, with which all the feathers are terminated. As the young bird advances in age, some red vinous feathers appear disposed irregularly upon the belly; the upper parts are of a tarnished brown, spotted with dirty yellowish; bill whitish brown, except at the point, where it is deep brown. (Temminck.)

The Hawfinch is plentiful in some districts of France, as well as in Germany, Sweden, and parts of Russia. It is not uncommon in Italy. In our island the Hawfinch is not often to be seen, probably more on account of its recluse habits than its actual rarity. Selby and others have remarked that this bird is only an occasional visitant, but it has been satisfactorily proved by Mr. Doubleday, that it is not migratory, but remains with us during the whole year, inhabiting dense woods, and invariably perching on the topmost branches of the tallest trees; it builds however in dense bushes.

Hard seeds and kernels form the principal food of the Hawfinch or Grosbeak, but it feeds also on the berries of the hawthorn, whence its name.

Willughby states that it breaks the stones of cherries, and even of olives, with expedition. The stomach of one which he dissected in the month of December was full of the stones of holly-berries. The majority of ornithologists give the Hawfinch credit for forming a nest beautifully constructed of lichens and vegetable fibres with a lining of feathers and other soft materials. But, according to Mr. Doubleday, who has thrown much light on the history of this bird, and discovered it breeding in Epping Forest in May and June, the nest, which is made in some instances in bushy trees at the height of five or six feet, and in others near the top of firs at an elevation of twenty or thirty feet, is remarkably shallow and carelessly put together, being scarcely deeper than that of the dove. In materials it resembles that of the bullfinch, but is not to be compared with it in neatness and compactness of construction. Eggs, from four to six in number, of a pale greenish white, varying in intensity, spotted and streaked with greenish gray and brown. Mr. Gould states that he has known the bird to breed near Windsor, and a few other places, but certainly nowhere so abundantly as on the estate of W. Wells, Esq., at Redleat, near Penshurst, Kent. This gentleman informed Mr. Gould that he had, with the aid of a small telescope, counted at one time eighteen on his lawn.

HAWICK. [Roxburghshire.]

HAWK. [Falconidæ.]

HAWKER. [Pedlar.]

HAWKESWORTH, JOHN, LL.D., was a successful writer of the last century. The date of his birth (1715 or 1719) and the occupations of his early life are variously stated. In so short a notice, all that is essential to record is that he was bred to some mechanical occupation, and therefore deserves the more credit for his talent and industry in supplying the defects of a rude and illiterate education. His first appearance was as a contributor to the 'Gentleman's Magazine,' in which he succeeded Dr. Johnson as compiler of the parliamentary debates in 1744. In 1752 he undertook, assisted by Johnson, Warton, and one or two others, a series of essays, called the 'Adventurer.' They extended to the number of 140 (70 of which are ascribed to Hawkesworth himself), and were received with great approbation. Herring, archbishop of Canterbury, was so much pleased with the work, that he procured a degree in civil law for the conductor. In 1761 he published an edition of Swift, with a life prefixed. On the return of Capt. Cook from his first voyage of discovery in the South Seas, he compiled an account of the voyage in three vols. 4to., 1773 [Cook], and received for recompense the liberal sum of 6000*l*. The work however did not give entire satisfaction; exceptions were taken to the warmth of his descriptions of manners, and to his religious speculations. The chagrin occasioned by these censures is said to have shortened the author's life. Dr. Hawkesworth translated 'Telemachus,' and wrote 'Almoran and Hamet,' an eastern romance, which was much admired. He was a regular contributor to the 'Gentleman's Magazine.'

HAWKING. [Falconry.]

HAWKINS, SIR JOHN, a distinguished seaman of the reign of Elizabeth, was born at Plymouth, about 1520. His youth was spent in trading to Spain, Portugal, and the Canaries. With the assistance of some merchants, he fitted out a small squadron in 1562, and obtained, partly by purchase, partly by force, a cargo of 300 negroes, whom he carried to Hispaniola, and there sold. This, we believe, was the first adventure of Englishmen in that inhuman traffic. He made a second voyage in 1564, and a third in 1567: the latter turned out unfortunately. He was attacked by the Spanish authorities in the port of S. Juan de Ulloa, and saved but two ships of his squadron, with which, after suffering great hardships, he returned to England in January 1568. In 1588 he served as rear-admiral against the Spanish armada [Armada], and was rewarded with the honour of knighthood. Being sent with Frobisher in 1590 to intercept the Plate fleet and harass the trade of Spain, he failed in the first object, but succeeded in the second. In 1595 he was appointed, jointly with Drake, to command a more important expedition against the Spanish settlements in the West Indies. This enterprise proved fatal to both these hitherto successful commanders. [Drake.] Hawkins died November 21, 1595. Sir John

Hawkins sat in parliament for Plymouth, and founded an hospital at Chatham for poor and sick seamen.

HAWKINS, SIR JOHN, was born in 1719. He was articled to an attorney, and remained in the law till 1759, when he retired with a competent fortune. While in the law, he cultivated the study of music, and associated with Dr. Johnson and other literary men. Between 1759 and 1772 he served as a Middlesex magistrate; and it was for his efficiency in this office that he was knighted.

Sir John Hawkins now set seriously about finishing a work which has gained a European reputation, his 'History of Music.' He went to Oxford, and there remained some time, to examine the books, in the Bodleian and other libraries, connected with his inquiry; and he spent two or three years in similar researches in other quarters. In 1776 the work appeared, in five quarto volumes, under the title of 'A General History of the Science and Practice of Music.' The work was appreciated by learned musicians; but Dr. Burney published a similar history about the same time, smaller in bulk and more pleasing in style; and other circumstances led to a series of most virulent attacks against Hawkins and his work, so that his 'History' fell almost dead from the press.

Time however has done that justice to the author which his contemporaries denied him. The work now fetches a price beyond that at which it was published; it is found in every good library; and, the more it is read and known, the more it will rise in public estimation and demand.

Sir John Hawkins afterwards published an edition of Walton's 'Angler' and a 'Life of Dr. Johnson.' He purchased and presented to the British Museum Dr. Pepusch's valuable musical library. He died in 1789, leaving behind him a high character both for moral and intellectual qualities.

HAWKSHEAD. [LANCASHIRE.]

HAWKSMOOR, NICHOLAS, who executed many buildings of note in the early part of the last century, was born in 1666, and at the age of seventeen became the pupil of Sir Christopher Wren. His style partook of the massive and heavy, combined with a certain coldness and baldness. Of this we have proof in the church of St. George's in the East, Ratcliffe Highway, commenced by him in 1715. That of St. Mary Woolnoth, in Lombard Street, is very much better. But it is chiefly as the architect of St. George's, Bloomsbury, that Hawksmoor is entitled to notice. St. Anne's, Limehouse, is another church by him, which deserves more praise than has fallen to its share.

Among his other works were Easton Neston, in Northamptonshire, and a mausoleum at Castle Howard. He was also employed to repair the west front of Westminster Abbey. The south quadrangle and street front of Queen's College, Oxford, have by some been attributed to him, though they are generally supposed to have been the work of Wren. That he did much at All Souls' College, in the same university, is unquestionable. He died in March 1736, at the age of 70.

HAWTHORN. [CRATÆGUS.]

HAY. [BRECKNOCKSHIRE.]

HAYDN, JOSEPH, was born at Rohrau in Austria on the 31st of March, 1732. While quite a child, he learned the violin and singing under a relation, and then practised in the choir of St. Stephen's at Vienna. He gradually studied composition, under circumstances of much privation, and earned a subsistence by his singing; but his soprano voice left him at the age of 17. Some pleasant hours with Porpora and Metastasio, a system of giving lessons, a few engagements as an orchestral performer, and an unhappy marriage, brought him down to the year 1761, when, at the age of 29, he became Kapell-Meister to Prince Esterhazy, and his privations were then at an end. In the prince's palace at Eisenstädt, in Hungary, Haydn composed all the great works which he produced prior to the year 1791, and under advantages which few have possessed—he had a full and choice band, living under the same roof with him, at his command every hour in the day.

In 1791 Haydn arrived in London to fulfil an engagement, and produced during that and the following year, at 'Salomon's Concerts,' in the Hanover Square Rooms, six of his 'Twelve Grand Symphonies;' and he also published many canzonets, quartets, sonatas, &c. In 1794, during a second visit, he produced the remaining six symphonies. His works and performances brought him large profits, as well as honours and compliments from all quarters.

In 1798 Haydn gave to the world his oratorio 'The Creation,' the greatest of his works, though composed in his sixty-fifth year. Two years after this he composed 'The Seasons.' The last productions of his genius were two sets of quartets.

Haydn retired to Vienna on a competency obtained by his professional labours, and died there in 1809. His works are astonishingly numerous, embracing every class. Among them are 116 symphonies, 83 violin quartets, 60 pianoforte sonatas, 15 masses, 4 oratorios, a grand 'Te Deum,' a 'Stabat Mater,' 14 Italian and German operas, 42 duets and canzonets, upwards of 200 concertos and divertissements for particular instruments, &c. Many of these, but not the most valuable, were irretrievably lost in the fire which consumed the palace of his patron at Eisenstädt; the best are out of the reach of danger; they have been printed and reprinted in most of the capitals of Europe. Haydn is universally deemed one of the most original and imaginative of composers.

HAYDON, BENJAMIN ROBERT, was born Jan. 26, 1786, at Plymouth, where his father was a bookseller. Haydon was educated first at the Plymouth Grammar-school, and afterward sat the Plympton Grammar-school, where Sir Joshua Reynolds had received his education. Haydon's father drew a little himself, and had a taste for art, and as his son early evinced some skill in drawing, he is said to have expressed his hope that, as Plymton had sent a Sir Joshua Reynolds into the world of art, it might also send a Sir Benjamin.

At the age of eighteen, an enthusiast for Raphael, Michel Angelo, and high art, Benjamin Haydon was entered as a pupil at the Ro

Academy, London, where his first work was exhibited in 1807. The title alone will show the daring of the young painter—'Joseph and Mary resting with our Saviour after a day's journey on the road to Egypt.' Mr. Hope, author of 'Anastasius,' became the purchaser of this picture. The reputation which the artist gained by it gave him increased energy and ambition. 'Dentatus' was the subject chosen by him next year; and from this period Haydon dates the commencement of a quarrel with the Royal Academy, whom he accused of illiberality or mismanagement in hanging his 'Dentatus' where it could not be seen, and of a fear of historical painting as the cause of their refusal to admit him as an associate, while they admitted less skilful artists. The 'Dentatus' was purchased by Lord Mulgrave, and in the following year was exhibited in the British Institution, where it received the praises of the public, and the prize of the committee.

Haydon, though he also quarrelled with Wilkie, with whom he had been on terms of intimacy, was not without friends. Sir G. Beaumont gave him a commission for a subject from Macbeth, and his 'Judgment of Solomon' was bought by Mr. Elford and Mr. Tingcomb for 700*l.*; his 'Alexander returning in triumph, after vanquishing Bucephalus,' found a purchaser at 500 guineas in the Earl of Egremont; and his 'Venus and Anchises' was purchased for 200 guineas by Lord de Tabley. Another application for admission to the Academy resulted again in disappointment.

His next great work was 'Christ's Entry into Jerusalem,' begun in 1814, but not exhibited until 1820, when it formed part of an exhibition of his own in Bond Street. The picture did not sell, but this did not prevent him from painting 'Christ in the Garden,' and 'Christ Rejected.' In May 1821, he married. His 'Raising of Lazarus,' now in the Pantheon-bazaar, London, was painted in 1823. He got into debt, and became an inmate of the Queen's Bench prison. Here he found a subject for a successful picture in the 'Mock Election,' which took place within those walls in July 1827. George IV. purchased this work for 500 guineas. Haydon followed up the subject in his 'Chairing the Members,' which was sold for 300 guineas to Mr. Francis of Exeter. He had previously regained his liberty with the assistance of friends. Another picture of the same period was his 'Pharaoh dismissing Moses after the Passover,' for which he obtained 500 guineas from Mr. Hunter, an East India merchant. Haydon's next subjects, after making an unsuccessful attempt to obtain employment as a portrait painter, were 'The Great Banquet at Guildhall' at the passing of the Reform Bill, and 'Napoleon musing at St. Helena:' the former was considered a failure, but the other met with great success. 'The Duke on the Field of Waterloo' fell far short of this, both in merit and public estimation. His last works were 'Uriel and Satan;' 'Curtius leaping into the Gulf;' 'Alfred and the Trial by Jury;' and 'The Burning of Rome.' The last two were exhibited in 1846 at the Egyptian Hall. The exhibition failed, and added to the embarrassment of his pecuniary affairs. Haydon died by his own hand, June 22, 1846, leaving a wife and family, for whom a public subscription was immediately got up. It appears that something had been done to relieve Haydon's embarrassments before his death; and it is recorded to the honour of Sir R. Peel, that, at what was perhaps the most busy and exciting period of his parliamentary career, he had found time to think of the artist, to whom he inclosed a cheque for 50*l.*

Haydon's 'Lectures' are almost his only contributions to literature. Considerable difference of opinion exists as to his merits as a painter. The exaggeration and hardness, which it must be admitted disfigured his general style, are ascribed to his early intimacy with and imitation of Fuseli.

HAYLEY, WILLIAM, was born at Chichester, in 1745, and studied at Trinity Hall, Cambridge, intending to practise as a barrister. Finding the law not to his taste, he settled on his patrimonial estate of Eartham, in Sussex, in 1774. Hayley died November 20, 1820. Of his numerous poetic works, the 'Triumph of Temper,' 1781, has been the most popular. The 'Essay on Painting,' 1778, and 'Essay on History,' 1781, rank among his best productions. We may add, as the most important of his other numerous works, the 'Essay on Epic Poetry,' 1782; 'Life and Poetical Works of Milton,' 1794–9; 'Essay on Sculpture,' 1800, addressed to his friend Flaxman; 'Life of Cowper,' 1802.

HAYMAN, FRANCIS, R.A., was born at Exeter about the commencement of the 18th century. He was the scholar of Robert Brown, and was in early life much employed as a scene-painter by Fleetwood, the proprietor of Drury Lane theatre, and by Tyers, the proprietor of Vauxhall. He painted some historical pictures, and also made many designs for booksellers, the best of which are the illustrations to Sir Thomas Hanmer's 'Shakspere.' He was the first librarian to the Royal Academy. He died in 1776.

HAYTI. [HISPANIOLA.]

HAZEBROUCK. [NORD.]

HAZEL. [CORYLUS; FILBERT.]

HAZLITT, WILLIAM, the son of a Unitarian minister of the same name, was born at Maidstone on the 10th of April, 1778. When he was five years old, his father transferred the scene of his ministerial exertions to America, and remained with his family in the United States for two years. On his return to England, the father became pastor of the Presbyterian congregation at Wem in Shropshire; and it is here that the work of Hazlitt's education was commenced. At the age of nine he was put to a day-school at Wem. In 1793 Hazlitt was entered as a student of the Unitarian college at Hackney, in order to be educated for his father's profession. But for this profession he had no liking; and, having from a very early age shown a taste for drawing, it was determined that he should follow the profession of a painter. He commenced with great ardour and assiduity, cultivating metaphysics in his intervals of leisure. In 1802 he visited Paris for the purpose of studying the paintings in the Louvre, and, on his return to England in the next year, he made a professional tour, and painted a consider-

able number of portraits; but he did not persevere. His notion of success was so exalted, and his fastidiousness so great, that he could never satisfy himself, and he determined on again changing his plans.

He now proceeded, in the autumn of 1803, to the metropolis to start as a literary adventurer. He commenced his almost endless series of publications with the essay on the 'Principles of Human Action,' which was published anonymously in 1805, and was followed up quickly by other works. In 1808 he married a Miss Stoddart, the sister of Dr. (afterwards Sir John) Stoddart, and after his marriage retired into Wiltshire, where he continued without intermission his literary pursuits. In 1811 he returned to London, and we find his residence in a house in York Street, Westminster, which had been once inhabited by Milton, and which then belonged to Bentham.

In 1813 Hazlitt delivered a course of lectures at the Russell Institution, on the history of English philosophy; and subsequently on the English poets generally, the comic poets, and the poets of the age of Elizabeth, in separate courses, at the Surrey Institution. He acted for a short time also as reporter to the 'Morning Chronicle,' and, after giving it up, still wrote occasionally in that paper, and also in the 'Examiner.' He was also, in the latter part of his life, a contributor to the 'Edinburgh Review,' and to some smaller magazines. His life was indeed one uninterrmitting course of literary exertion; and his labours brought him in a considerable income, which however his imprudence always quickly dissipated.

In 1822 he was divorced from his wife, and two years afterwards married a second time. He died on the 18th of September, 1830, of cholera, and was buried in the churchyard of St. Anne's, Soho, London.

Hazlitt's principal works, besides those which have been already mentioned, are the 'Round Table,' in which he was assisted by Mr. Leigh Hunt; the 'Table-talk;' the 'Plain Speaker;' the 'Characters of Shakspere's Plays;' the 'Spirit of the Age;' his 'Political Essays,' which are collected from different newspapers and magazines, and published in one volume, with a preface, by Hone; and the 'Life of Napoleon,' which Hazlitt himself looked upon as his great work, and which was his last. The article 'Fine Arts,' in the 'Encyclopædia Britannica,' was also written by Hazlitt.

The principal merits of Hazlitt as a writer are force and ingenuity of illustration, strength, terseness, and vivacity. Since his death, two volumes of his 'Literary Remains' have been published by his son, with a short life, which shows much taste and good feeling.

HEAD. [Brain; Skeleton.]

HEAD, INJURIES OF THE. From the many peculiar and important features which they present, injuries of the head have properly received a separate consideration in all systems of surgery: for, not only is the brain so essential to life that even its least injury must be regarded as serious, but the parts around and guarding it have many peculiarities. The injuries of the head are best considered as they affect the parts inclosing the brain or the brain itself.

In mere bruises of the scalp two circumstances are worthy of notice. A vessel of some size may be burst without the skin over it being wounded, in which case a most copious effusion of blood takes place, raising up the scalp from the skull, and producing rapid swelling of the whole of the upper part of the head. It needs however no particular treatment; no incision should be made into it, for, if cold wet cloths be diligently applied, the blood will be again rapidly absorbed.

A common superficial wound of the scalp needs no particular treatment. It should be closed with sticking-plaster after the hair around it has been shaved off, and it should be kept cool with pledgets of lint dipped in cold water and covered with oiled silk; but, to guard against mischief to the adjacent parts, the patient should avoid all stimuli, and all exertion of either body or mind, till it is completely well.

One of the most common sequels to injuries of the scalp is erysipelas of the head and face. It generally occurs in persons of an unhealthy habit, in hard drinkers, and in the full and plethoric. It commences about the third or fourth day after the injury. There is general fever, and the head and face feel very hot, and become red and swollen, appearances which increase, and after a day or two are accompanied with an eruption of small blisters, full of yellow fluid. There is no pain on touching the parts; but by the great swelling the eyes are often closed, and the features almost obliterated. Active reducing measures should, as a general rule, be early employed, and continued, if the disease does not yield, as far as the patient's strength will permit; and purgatives, with small doses of mercury, may be given.

Another affection which sometimes follows injuries (and especially punctured wounds) of the external coverings of the skull is inflammation and consequent extensive suppuration in the loose tissue connecting the tendon of the muscle covering the top of the head with the pericranium. When this affection is suspected to be coming on, leeches should be put on the head in large numbers about the wound, and cold diligently applied; but, if matter should form, one or more free incisions should be made through the scalp to let it out, and the part afterwards treated like a common abscess.

In cases in which the bone has been exposed the same general and local treatment should be employed.

When the bone itself is injured, no active treatment should ever be adopted, unless there are evident signs that the brain is suffering from compression or other remediable injury.

The vessels of the dura mater may be ruptured by the jar from a blow which does not even break the skin. The blood that flows from them, accumulating between the dura mater and the skull, produces compression of the brain. The only help in these cases is to bleed the patient largely, check the flow of blood in the head, and, if that be not evidently beneficial, to apply the trephine

wherever it is most probable that the blood may be found and removed.

Instead of blood, purulent matter may collect between the dura mater and skull, and produce equally fatal results. This is indicated by the patient (usually some considerable time after the accident) complaining of headache, restlessness, and extreme languor; he has frequent irregular shiverings, his pulse is quick and hard, and he cannot sleep: if unrelieved by treatment, all these symptoms increase, and are shortly followed by delirium, convulsions, insensibility, or paralysis, which are no distant precursors of death. A humour forms on the part struck, and, if this be opened, the pericranium will be found detached to some extent from the skull.

The brain itself may suffer injury either from blood effused in it by rupture of its vessels, from compression by fractured portions of bone being forced down upon it, from wounds, from concussion, or from inflammation, and its various effects following any of these injuries. The first does not differ in its symptoms from the cases of common apoplexy with effusion of blood [APOPLEXY], and admits of no mechanical treatment. The second class comprehends the most important injuries of the head; those of 'fracture with depression,' as they are called, and those which occasionally happen in children, in which the skull is indented without being broken. The symptoms of such an injury are insensibility, generally in direct proportion to the degree of pressure; the breathing is slow, laboured, and snoring, and at every expiration the cheeks are puffed out and elevated; the pulse is slow and irregular; the pupil widely dilated and insensible to light; the patient neither feels nor moves, and lies as if in a fatal state of apoplexy. The evident and indeed the only mode of affording relief is to remove the pressure from the brain, by exposing the fractured part of the skull by enlarging the wound in the scalp, or making a fresh one, and taking away or elevating all the portions of bone that are depressed. Such cases, and all others in which compression cannot be mechanically relieved, can only be treated like common apoplexy, by bleeding the patient, by cold sedulously applied, and by rigorous reducing measures.

The immediate consequences of wounds of the brain vary greatly, and indeed unaccountably: in some cases a very slight injury is rapidly fatal, as in those (of which many are now recorded) in which a pointed instrument has passed in through the orbit, and produced almost instant death; whilst in others severe and extensive injuries, as from gun-shots, have been followed by serious symptoms at only a late period from their reception.

The last injury of the brain that needs particular notice is that called concussion or commotion. In its slightest degree it is merely a stunning, from which perfect recovery takes place in a few minutes; when most severe, it is rapidly fatal; but, even then, a post-mortem examination discovers no alteration whatever in the structure of the brain. One of the most interesting points in surgery is the diagnosis of concussion from compression of the brain. As the latter seldom occurs without the former (for of course a blow which would fracture or indent the skull would violently shake the brain), compression has the symptoms of concussion, with the addition of some of the most severe which we have already mentioned. In concussion the patient is insensible only to slight impressions, for, if he be loudly called to, he will wake up, answer a word or two, perhaps even rationally, and then relapse into the same state. If he be severely pinched or otherwise irritated, he will withdraw the part so injured: he occasionally moves his limbs; he appears, in short, as if in a sound heavy sleep like that of a drunken man. The breathing is not stertorous, but generally quite natural; the pupil is contracted and irritable; the pulse is sometimes unaffected, but in severe cases small and weak; there is nausea or vomiting, and the extremities feel cold. If the case is about to terminate fatally, the whole body grows rapidly cold, the pulse becomes irregular and weaker, the breathing short and interrupted, and the insensibility increases. In treating cases of concussion much caution is needed: it has not appeared that bleeding, which is the remedy popularly expected for all such accidents, has at all diminished its primary symptoms, nor has the contrary treatment by stimulants been more successful. The patient, while suffering from the immediate stunning consequences of the blow, should merely be kept quite warm in bed, and carefully watched; if the pulse grow weaker, the extremities colder, and the other symptoms of sinking seem increasing, stimulants are first called for, and should be given till he is completely roused to his former state; but if, instead of being depressed, he remain stationary, no active means of any kind should be employed.

HEALTH, PUBLIC. [PUBLIC HEALTH.]

HEANOR. [DERBYSHIRE.]

HEARING. [EAR.]

HEARNE, THOMAS, an eminent English antiquary, was born at White Waltham, in Berkshire, in 1678, where his father was the parish clerk. In 1692, under the patronage of Francis Cherry, Esq., of that place, with whom he had till then lived as a menial servant, he was placed at the free-school of Bray, and subsequently, in 1695, at that gentleman's expense, was entered of Edmund Hall, Oxford. He became B.A. in 1699. In 1701 he received his first employ in the Bodleian Library. He was afterwards made janitor of the library, and in 1712 succeeded to the place of second librarian. In January 1715, he was elected architypographus and esquire bedel of civil law in the university, which post he held with his under-librarianship till the month of November following, when he resigned the bedel's place, and soon afterwards his post in the Bodleian Library, on account of the oaths to the government, which he could not conscientiously take. He continued a non-juror to the last, much at the expense of his worldly interest. He died June 10, 1735.

Hearne's publications were almost exclusively printed by subscription at Oxford, and are very numerous. Among the most valuable are—an edition of Livy, 6 vols. 8vo., 1708; the 'Life of Alfred the

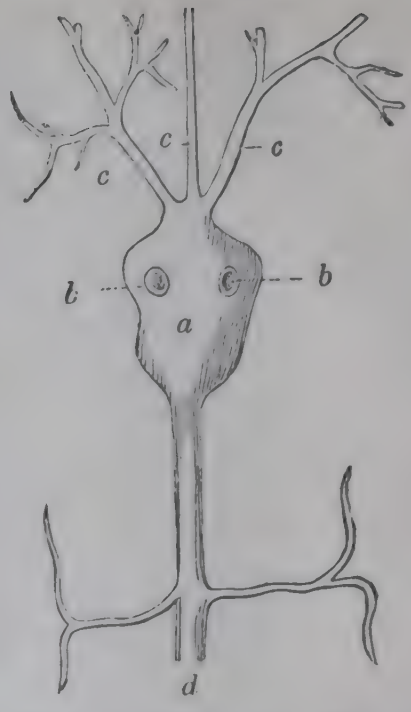
Great,' from Sir John Spelman's MS. in the Bodleian Library, 8vo., 1710; Leland's 'Itinerary,' 9 vols. 8vo., 1710; Leland's 'Collectanea,' 6 vols. 8vo., 1715; Camden's 'Annals,' in Latin, 3 vols. 8vo., 1717; 'History and Antiquities of Glastonbury,' 8vo., 1622; 'Robert of Gloucester's Chronicle,' 2 vols. 8vo., 1724; 'Peter Langtoft's Chronicle,' 2 vols. 8vo., 1725.

HEART is the central organ of the circulation, and by its alternate contractions and dilatations is one of the principal powers by which the blood is moved through the bodies of the higher animals.

The simplest mode, by which a distribution of nutritive fluid is effected, is by means of ramifications proceeding from the stomach or intestinal canal to various parts of the body, which occurs in the polyps, infusoria, intestinal worms, echini, medusæ, and other zoophytes. In all these the digestive canal and the circulating system form but one apparatus: the food, which in the higher animals requires a complicated process of assimilation before it is fitted to move with the blood, is in them already adapted for nutrition. In most of them currents can be seen passing in opposite directions along the canals opening into the digestive cavity, exactly like those well known to exist in the stems of charæ, and probably produced by the motion of ciliæ which line the tubes, but are too minute to be discerned even with the microscope.

In the annelida the circulation is carried on by means of two large vessels which alternately contract and expand, and thus carry the circulating fluid to all parts of the body. The first indication of an organ like the heart is seen in insects, which have a large vessel running along the back, divided by numerous constrictions into a series of communicating cavities, between which there are lateral openings through which the blood is received, and which are guarded by valves to prevent the blood from flowing out. Through this, which is commonly called the dorsal artery, but which may rather be regarded as a series of ventricles, the blood passes from behind forwards, diverging into small streams, one of which flows to each of the antennæ, feet, &c. No distinct vessels can be detected in which these minor currents may run; they seem simply to pass through the various tissues, and, having arrived at their destinations, to form there into arches, and return and empty themselves into abdominal vessels, which may be regarded as veins, and through which the blood flowing from before backwards is returned into the dorsal artery through the communications which exist between them at the posterior part. This is also the plan of the circulating system which with various modifications prevails in the arachnida and the lower crustacea.

The simplest kind of a heart, forming a defined cavity, is found in some of the larger crustacea. The annexed sketch represents the heart and large arteries of the lobster. There is a single cavity or ventricle (*a*), into which the arterial blood flows from the gills, by vessels which unite into two trunks, whose orifices (*b*, *b*) are protected by valves. Six main arteries proceed from the heart; the three anterior (*c*, *c*, *c*) go to the head; two from its inferior part to the liver; and the largest



of all (*d*) from its posterior part. This last gives off a superficial and a deep artery to the tail, and then, curving forwards under the sternum, gives branches to the feet and deep arteries to the head. From these the blood returns by veins into a number of venous sinuses which lie at the sides by the articulations of the legs with the chest, and all communicate together. From them branchial arteries proceed, which run on the outer edge of the gills, and pass through capillary vessels in them, terminating in branchial veins which unite into the two trunks that open into the heart.

In most of the mollusca the blood flowing through the branchial veins, instead of being poured directly into the ventricle, is received first into an auricle, presenting the first instance of a heart with more than one cavity. In most of the gasteropoda and pteropoda the auricle is single; in the bivalves the auricle is double.

Among vertebrate animals the simplest form of heart is found in fish. They have a single auricle which receives the blood from the trunks of the veins of the whole body, and communicates with a single ventricle, which forces the blood into an arterial trunk with a contractile bulb. From this trunk all the branchial arteries arise, and, passing on each side in arches to the gills, divide there into capillary branches. The blood thus aerated passes on, and the arches again unite into a common trunk the true aorta, which runs along the under surface of the spine, and sends the blood to all parts of the body. From these it collects again into the systemic veins, by which it is carried back to the auricle. The same type of formation is found in the reptiles which have gills.

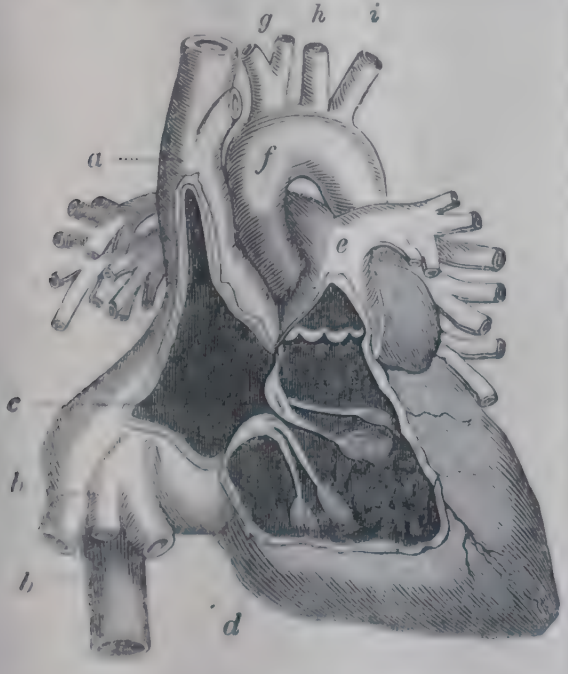
In the air-breathing reptiles there is a single ventricle from which arises a single aortic trunk from which proceed two pulmonary arteries, conveying that part of the blood which is to undergo respiration to the lungs, whence it is returned by pulmonary veins. From the same aortic trunk four other arteries arise, two of which, forming

arches, unite to form the dorsal aorta, while the two uppermost are distributed to the head and upper extremities. From the terminations of these arteries in all parts of the body the blood is collected into large venous trunks, which open into a double auricle, from which the aerated blood from the lungs and the impure blood from the system pass separately into the common ventricle, in which they are intimately mixed.

Man, mammalia, and birds have a double circulation, to which some of the forms just described make very close approximations.

The heart of man may be taken as the type of this circulation. It is of a somewhat conical form, having its base directed backwards towards the spine, and its point forwards, downwards, and to the left side, so that at each contraction it may be felt striking between the 5th and 6th ribs, about four inches from the middle line. It rests upon the diaphragm, or muscular partition between the chest and abdomen, and the surface upon which it lies is much flattened. It is firmly attached to the diaphragm at its right side, and behind by the inferior cava, which passes through that muscle, and above and behind it is fixed, though more loosely, to the upper and back part of the chest by the rest of its great vessels, which there pass out of the pericardium, and are united to the surrounding cellular tissue and organs. Everywhere else it is quite free and moveable, though the range of its motions is limited by the pericardium, or membranous bag in which it is contained, and which closely surrounds it at all times.

To examine the interior of the heart, it should be removed from the pericardium, and an incision



should be made into the front of the right or front auricle, so that an angular flap may be cut out of its walls, and the whole view of the back part and sides of its interior may be exposed. There will then be seen, behind and to the right side, two large apertures; the upper leading to the vena cava superior (*a*), through which all the blood is returned from the head and upper extremities, and the lower leading to the vena cava inferior (*b*, *b*), by which all the blood is conveyed from the abdomen and lower extremities. These apertures will be seen to be surrounded by a few muscular fibres continuous with those of the auricle itself, and that of the inferior cava is partially guarded by a thin semilunar membranous fold, called the Eustachian valve, varying much in size, and often much torn. The left side of the cavity, on the partition which separates it from that of the right auricle, presents an oval depression (the fossa ovalis) surrounded by an elevated border, indicating the situation of the foramen ovale, through which, during the fœtal state, the blood, which was prevented by the Eustachian valve from passing into the ventricle, was conveyed directly from the right into the left auricle, and thence into the left ventricle. Lastly, at the anterior and left angle of the cavity another and the largest aperture (*c*) is seen, which leads into the right ventricle, and has attached to its sides a membranous curtain (*d*), by which it is occasionally closed, and which is called the tricuspid valve.

Proceeding in the course of the circulation, a cut should be made from the right auricle through the aperture leading from it into the right ventricle, and along the front of the heart nearly to its apex, and then another from the end of the first upwards into the pulmonary artery, as it arises from the front and upper part of the ventricle. By raising the portion thus cut out, a complete view of the cavity of the right or pulmonary ventricle, and of its communication with the auricle, will be seen. The cavity of the right ventricle has a somewhat conical form, with its base uppermost, that part of its walls which is formed by the septum projecting somewhat into it. Its walls are rendered extremely irregular by prominent bands of muscular fibres. Here and there stand out short columns of muscle projecting into the interior, and pointing towards the right auricle; these are called columnæ carneæ, and they have attached to their summits fine tendinous cords (chordæ tendineæ), which pass thence to be attached to the edges of the curtain-like membrane (the tricuspid valve) which guards the orifice between the auricle and ventricle. This orifice is of a broadly oval form, surrounded by a ring of firm dense tissue, to the whole interior circumference of which is attached the fold of membrane, strengthened by tendinous fibres, forming the valve.

From the front and upper part of the ventricle a smooth short passage leads to the origin of the pulmonary artery (*e*), which is attached firmly to the dense ring to which many of the muscular fibres of the ventricle are affixed. At their union, and at the very orifice of the pulmonary artery, three little valves (the semilunar, sigmoid, or pulmonary valves) are seen, of a semi-lunar form, attached by the whole length of their convex edges to the walls of the artery, and hanging loosely in it with their free festooned edges directed upwards, inclosing behind them three small spaces, where the artery bulges somewhat outwards. These valves completely close the

orifice of the artery inwards, so as to prevent any fluid from passing into the ventricle.

The left posterior or aortic ventricle and auricle differ in no important particular from the right. The walls of both cavities on the left side and all the parts contained in them are thicker and stronger than those on the right; the orifice between them is guarded by a valve which has only two principal divisions, and is therefore called the mitral valve. The aorta (*f*), proceeds upwards, and to the right side, then arches backwards and to the left, and, turning over the main air-tube of the left lung, passes down along the spine, at the lower part of which it divides into two large arteries (the common iliacs) which supply the pelvis and lower extremities. From the upper part of its arch it gives off the main trunks of the head and upper extremities in three large trunks—that most to the right, called arteria innominata (*g*), is the common trunk which divides into the right carotid for the right side of the head, and the right subclavian for the right arm and side of the neck and chest. Next to it is the left carotid (*h*), and next the left subclavian (*i*), of which the distribution is similar to that of those on the right side.

During life the blood, returning from the whole body by the veins which unite to form the two venæ cavæ, enters the right auricle and gradually distends it, at the same time that the blood returning from the lungs by the pulmonary veins enters the left auricle and distends it. When completely filled, a kind of vermicular motion is seen commencing at the point of each auricle, which is rapidly propagated along their walls, and simultaneously empties the contents of the one into the right, and of the other into the left ventricle. The ventricles are no sooner completely filled than they contract suddenly and with much greater force than the auricles, and propel the blood into the pulmonary artery and aorta. From the aorta the blood is propelled into the arteries, through which it is distributed to all the body, and returned by the veins; but the veins of the intestinal canal and the organs connected with it unite into a large trunk, the vena portæ, which, instead of at once entering the heart with the others, passes into the liver, and there again divides into minute capillary vessels, from which the bile is secreted, and which pass into the ultimate divisions of a series of hepatic veins, which collect into three or four large trunks which open into the vena cava inferior just before it passes through the diaphragm to enter the right auricle.

Harvey considered the heart to be the sole agent by which the circulation is effected, but it is certain that several other agents exercise auxiliary powers. That the heart has, however, an influence on all parts of the circulation is quite evident. In the larger arteries its effect is seen in the increase of the current which it has set in motion, in exact coincidence with the contraction of the ventricles; in the smaller ones, by the same increase at a scarcely appreciable interval; in the capillaries, by the occasional pulsatile motion which may be seen in them, when, after an animal has been largely bled, its transparent parts are examined with the microscope, and this though the heart is acting very weakly. Lastly, in the veins we find its influence still exerted; for, if the main artery and vein in a limb be exposed and isolated, and the latter be wounded, the flow of blood from the orifice may be exactly regulated by compressing the artery, that is, by preventing, to a greater or less extent, the blood from flowing to the vein with the impulse given to it by the heart. It appears also that, in addition to propelling the blood, the heart during its expansions draws up the blood so that it acts both as a sucking and a forcing pump.

From the heart the blood is poured into the arteries, a series of ramifying tubes through which the current is distributed, divided into a gradually increasing number of streams, which progressively diminish in size, till it arrives at a network of the most minute canals, the capillaries.

1, Trunk of the artery; 2, large branches into which it subdivides; 3, small branches, successively becoming smaller and smaller until they terminate in, 4, the capillary branches.

The chief property of the arteries by which they affect the circulation is their extreme elasticity. It is by this that when dilated they contract on the blood that had been forced into them, and propel it in every direction—and that when elongated they again shorten, and that when

empty they remain open and tubular. The chief effect of the action of this elasticity is the gradual conversion of the jetting pulsatile motion which the blood receives from the forcible and successive contractions of the ventricle into an even and steady current.

We have said that the arteries are dilated slightly by each column of blood poured out by the ventricles: from this arises their *pulse*, which may be said to be owing to the dilatation of the arteries produced by the wave which is propagated along the column of blood contained in them. The frequency of the pulse depends entirely on the number of contractions of the left ventricle in a certain time; and hence the varieties of frequent, slow, irregular, and intermitting pulses are entirely referrible to the heart. The size and degree of contraction of the artery produces the fulness or smallness, the hardness or softness, and all the other characters which are determined by the touch rather than by mere counting.

From the fact that the great chemical change by which heat is developed in the animal system takes place in the capillaries, it follows that their influence on the circulation is very considerable. They form a dense network of extremely minute tubes, in which the arteries seem to terminate and the veins to arise, for their delicacy prevents the possibility of discovering any such structure as could decide to which set of vessels they belong, and indeed it is only by observing that the currents of blood-globules pass in regular directions that we can prove that they are canals with definite membranous walls. When the circulation is examined in the web of the foot of a frog (from which the annexed highly magnified sketch is taken), or in the transparent parts of other animals, as the fins, tails, or lungs of fish, frogs, lizards, &c., we see a number of minute

globules coursing along in little streams, in some parts in a confused multitude, as in the vessels which are sufficiently large to admit several to pass together, at others in only a single line, where the vessel is but little larger than the globules

itself. The currents run generally in the same direction in the same vessels, all tending to a larger branch, which may be regarded as the commencement of a vein, and setting out from the minutest termination of the artery. The capillaries are the most delicate of all organic tissues, measuring from $\frac{1}{2000}$ to $\frac{1}{3000}$ of an inch in diameter; they exist in all tissues of the body, varying in arrangement only in the greater or less closeness of the network which they form, and of which the meshes are in some organs so fine as not to exceed in width the diameter of the capillaries themselves, as is the case in the iris and lungs. It is through these vessels that all the important processes of secretion, nutrition, and absorption are effected.

The influence of the minutest arteries and veins, and of the capillaries, on the circulation, is best seen in the phenomena of local action, as inflammation, blushing, turgescence, &c. If the web of a frog's foot placed in a microscope be irritated, the capillaries are seen slowly contracting, so as sometimes to prevent the flow of blood through them; and, if the stimulus be so great as to produce inflammation, then they dilate, and a larger number of globules is seen passing along them with great rapidity. The same may be seen in the human eye, when particles of dust get into it. On a larger scale, one sees after a wound or other injury the parts around grow redder, and swell from the afflux of blood to its capillaries; and if the inflammation arise in a part which can be compared with another similar one, as in the hand, one feels that the pulse is fuller and stronger on the injured than on the sound side, indicating that a larger quantity of blood is passing through it. A still more evident accumulation of blood is shown in blushing, in which, from a mental impression, in an instant all the minute vessels of the face, neck, head, &c., become distended with blood. The paleness of fear is produced by the opposite condition; and we have other cases in which a decrease of the quantity of blood in a part is seen in the deficient nutrition and shrinking of parts which have become useless, as in the gills of tadpoles, the horns of deer, &c. All these circumstances are clearly sufficient to prove that, independent of any influence extending from the heart or arteries, there is in the very minute vessels of all parts a power by which the supply of blood passing through them may be either increased or diminished.

Following the course of the circulation, we come now to the veins, which may be regarded as the most passive of the parts engaged in it, though they are constructed so as to permit many important external agencies to act upon the motion of the blood. In addition to these peculiarities of structure, the veins have valves, very similar to those at the origins of the arteries, which are arranged in pairs, or in threes, at different distances, in the course of nearly all those veins in which the blood has to rise against the power of gravitation. Their simple use is evident; the blood, returning slowly through the capillaries, and much of the force of the heart being expended in propelling it so far, would be apt to retrograde,

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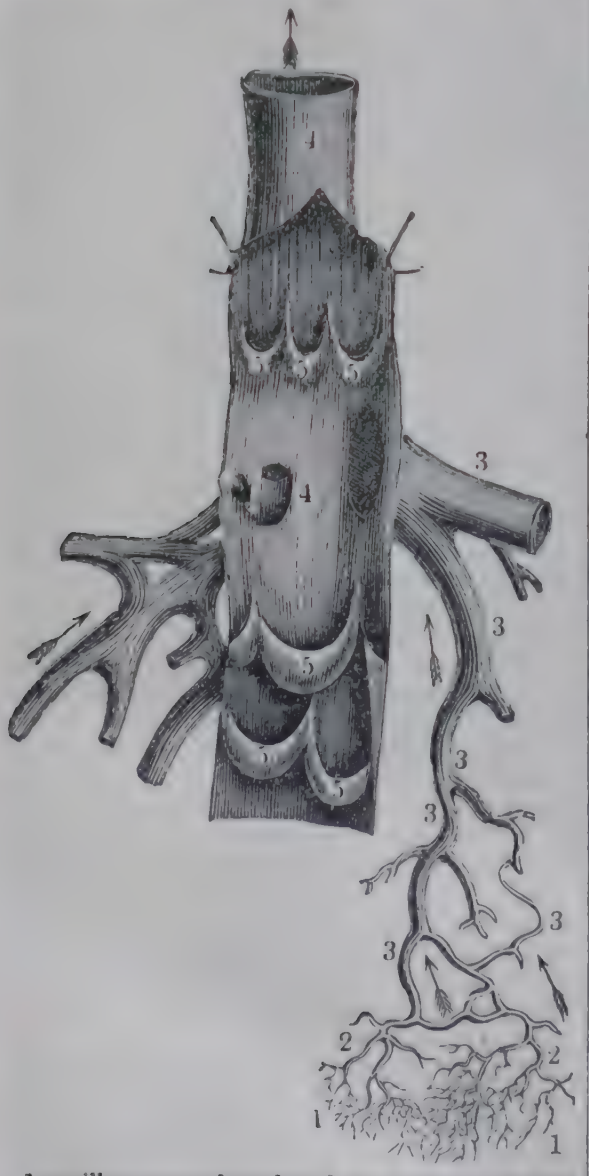
or remain stationary, if the weight of the whole column in the veins bore down upon the arteries, and through them on the heart. As soon however as a portion is raised into a vein, when it tends to return to the arteries it forces down the valves, which close the canal of the vein and support the blood above them, till another portion rising sends it onwards. Thus, while they permit the blood to pass without obstacle towards the heart, they entirely prevent it from retrograding; and, if it were stationary, the column of blood would be like a stream branching out, and divided by a number of closed locks in which the portion of fluid between any two is prevented from exercising any influence on the portions adjacent to it.



1, capillary venous branches; 2, small branches formed by the union of the capillary; 3, larger branches formed by the union of the smaller and gradually increasing in size, to form, 4, the great trunk, a portion of which is laid open to show its inner surface and the arrangement of, 5, the valves formed by its inner coat.

HEART, DISEASES OF THE, may be divided into those which occur in its investing membrane, those which affect it as a whole, and those of its various parts.

Pericarditis, Inflammation of the Pericardium, resembles much, in its pathological conditions,

inflammation of other serous membranes, and is induced by similar causes, as exposure to damp and cold. It of course presents peculiar symptoms, arising from the situation and nature of the individual organ; thus the patient will complain of tenderness over the region of the heart, amounting, when pressure is made, to acute lancinating pain, which prevents him from lying on the left side, and is much increased by drawing deep inspirations, or coughing, this latter symptom frequently depending on the pleura being involved in the inflammatory attack. This pain, however, is not always so severe; frequently only a sense of oppression is felt. The pulsations of the heart are frequent, sometimes regular, but at other times intermittent, and so strong as to constitute palpitations; but still, if much effusion has taken place into the pericardium, the hand when applied to the chest will have difficulty in perceiving them. The præcordial portion of the thorax is often bulged out by the forcible action of the heart and the quantity of fluid effused into the cavity of the pericardium. This effusion varies much in quantity and consistence at different periods of the disease: thus in many cases only a little bloody serum will be found; in others, pus in large quantities, coagulated lymph, bands of fibrinous matter uniting the two layers of the serous membrane, and even cartilaginous or osseous deposits. The dull sound discovered by percussion in the præcordial region of a person in health is always, in this disease, increased in proportion to the quantity of fluid in the pericardium, and, in proportion as this fluid becomes organised, sounds will be heard by the application of the stethoscope, and often of the unassisted ear, varying in their nature according to the state of the organising process, and resembling at one time the creaking of new leather, at another the rubbing together of paper or parchment, the noise made by a file, &c. Other sounds also are frequently heard, which depend upon the disease being accompanied by lesions within the heart itself. This disease frequently accompanies acute rheumatism, and forms one of the worst features of that very common affection.

2. Serum is sometimes found in the pericardium independent of inflammation, constituting the disease known as *hydro-pericardium*.

3. *Displacement.*—The heart is not always found in its usual situation at the time of birth, there being cases on record where it occupied the right instead of the left side of the chest, the other organs of the body presenting at the same time a relative change of position without any disturbance of their functions. It has also been found pushed out of the left into the right side of the chest by tumours, or, what is more common, by extensive effusion of fluid into the pleura of the left side of the chest.

4. *Carditis; Inflammation of the Heart.*—The proper muscular structure of the heart is not free from the attacks of inflammation; but where this disease exists there will also be found traces of it in the pericardium, or in the lining membrane of the heart, or in both; and we cannot point out symptoms of the one distinct from those of the

other disease: the treatment consequently is similar in both.

5. *Hypertrophy of the Heart.*—Independently of any morbid process existing in itself, the muscular structure of the heart is often greatly increased in bulk, as if the nutritive process were too active in proportion to the absorbent, and new matter were deposited more rapidly than the old could be removed. From the peculiar nature of the functions of the heart this disease becomes very important, and its effects not less dangerous than manifold. It is usually divided into three kinds: namely, simple hypertrophy, the least common, in which the parietes are thickened without any change of capacity in the cavity; eccentric or aneurismal hypertrophy, the form most frequently met with, in which the parietes are thickened and the inclosed cavity or cavities proportionally enlarged; and concentric hypertrophy, where the cavity is diminished in proportion to the thickness of the parietes. Any one of these kinds of hypertrophy may affect the parietes of either cavity of the heart, or the whole organ. The extent to which this increase of size may proceed is enormous; hearts have been found weighing upwards of twenty ounces, whereas the average weight of a healthy heart is from seven to nine ounces. In hypertrophy the chest is often bulged out towards the left side, the sound produced by percussion more dull than in the healthy state, and the pulsations very strong; indeed the bed-clothes are often visibly raised, and the head or hand of the observer when applied to the chest forcibly repulsed, yet the pulsations are for the most part regular, unless palpitations be induced by over-exertion. The sounds perceived by auscultation are louder than natural. Hypertrophy of the left ventricle of the heart sometimes brings on apoplexy and hæmorrhages.

This is a disease in which great perseverance is required on the part of the patient and the practitioner, but with proper care it frequently admits of much alleviation. Rest, abstinence, sedative medicines, and more or less depletion, according to the circumstances of the case, are the most efficacious plan of treatment.

6. *Atrophy of the Heart* has also been observed accompanying a state of general debility of the system.

7. *Dilatation of the Heart.*—It has been shown that the heart may be increased or diminished in substance, or may be hypertrophied or atrophied. The whole substance of the heart, or either of its cavities singly, or the orifices of these cavities, may be dilated, the solid parietes being merely extended, without any increase of substance, and the contained cavities proportionally enlarged. As in hypertrophy, so in this disease, according to its extent, the shape of the heart will be much changed. The muscular parietes being thinned and feeble, the circulation of the blood will not be carried on with vigour, and the patient will be weak and unfit for exertion, easily exhausted by small losses of blood, and sometimes carried off by what under ordinary circumstances would be deemed a trifling hæmorrhage. Excessive exertions and strong passions seem to be exciting causes of this disease, and from the influence of these causes the patient should be sedulously guarded, and at the same time every remedy must be adopted which may contribute to equalise the circulation.

8. *Endocarditis; Inflammation of the interior lining membrane of the Heart.*—This disease is not very frequently met with uncombined with some other inflammatory disease; rheumatism, pericarditis, carditis, or inflammation of the internal coat of some of the veins, will be usually found, if not to accompany, at least to have preceded it.

The principal symptoms of endocarditis are more or less fever and anxiety; some bulging of the præcordial region, if accompanied by pericarditis; an extension of the dull sound heard on percussion in the healthy state; the pulsations of the heart unusually strong, and sometimes very rapid and intermittent, repulsing the hand when applied to the chest, and producing a peculiar vibratory sensation. Upon auscultation the bellows' sound will be heard, masking one or both of the normal sounds.

The causes of this serious malady are similar to the causes of pericarditis, and the treatment must be actively antiphlogistic.

9. *Disease of the Valves.*—The internal lining membrane of the heart is often thickened, especially at the valves; and after repeated attacks, or a long chronic form of endocarditis, the valves will not merely be thickened, but will become the seat of a variety of warty excrescences, or even cartilaginous and osseous formations of considerable size, extending into the cavities of the heart. This ossification is most frequently met with in old persons, and especially those who have been addicted to a too generous mode of living. The morbid sounds produced by these obstructions at the various orifices will resemble those of the bellows, file, or saw, according to the degree of the obstruction; and sometimes a triple or even a quadruple sound will be perceived instead of the two normal sounds. The effects of these obstructions will be sanguineous and serous congestions, oppressions of the breath, apoplectic seizures, and other symptoms of embarrassed circulation.

10. *Ruptures of the Heart.*—Ruptures are sometimes found to occur, not only in the valves and columns of muscular fibres within the heart, but also in its parietes. The effect of such injuries will depend upon their extent and situation. A valve, or one of the bundles of muscular fibre, cannot be broken through without causing much inconvenience to the free circulation of the blood; but it seldom happens that the parietes of either cavity of the heart are sufficiently injured to allow the free passage of blood into the pericardium without instant death being the consequence.

11. *Persistence of the Foramen Ovale.*—It is by no means very uncommon to meet with cases in which the opening leading from the right to the left auricle of the heart has not been properly closed up at the time of birth. According to the extent of the communication thus remaining, a greater or less proportion of venous blood will pass into the left side of the heart, and, being there

mixed with red blood, circulate through the arterial system.

The symptoms of this disease are blueness of the skin, lips, and nails; a temperature of the body below that which is natural and healthy; shortness of breath, palpitations, faintings, a sense of suffocation induced by slight exertion, and sometimes a great disposition to hæmorrhage and depression from small losses of blood. This disease has, from the colour of the skin, been named 'blue disease,' 'morbus cæruleus,' or 'cyanosis.'

12. *Nervous Diseases of the Heart.*—These are met with chiefly in women suffering from anæmia, chlorosis, hysteria, and other nervous symptoms; and in men in whom a naturally nervous temperament has been rendered more irritable by the too free use of stimuli or by depressing passions. In all these cases great attention should be paid to the general health. In the cases of anæmia and hysteria, iron medicines and the shower-bath will be of the greatest service; and, as far as possible, sources of anxiety should be removed.

HEARTSEASE, or PANSY, is the cultivated state of the plant called *Viola tricolor* by botanists, improved by crosses with *Viola altaica*, and other allied species.

Several hundreds of beautiful varieties are now common in gardens. Although they will all grow in almost any kind of soil, yet, in order to bring the finer sorts to any degree of perfection, a loam, mixed with sand, and highly manured, is absolutely necessary. By proper treatment they may be had in full flower at two different seasons—from April to June, and from September until the frost destroys them.

The original species from which all these varieties sprang are easily preserved; but this is not the case with many of the finer sorts, which, as in animals and in other plants, the higher they are bred, and the finer the kinds, are in proportion difficult to keep in health. The principal causes which affect them are excessive heat in summer, and wet and cold in winter. They are, however, easily propagated, and only require to be looked over frequently, when, if any of them are found damping or decaying at the bottom of the stem, the top must be taken of, and struck. When there is danger of losing any of the sorts during winter, the best way is to strike a quantity in autumn, and to place hand-glasses over them until spring; at that time those which are alive may be soon multiplied in abundance.

Where fine large flowers are wanted, the plants should always be struck from cuttings the same season, and grown rapidly. In striking them, artificial heat is altogether unnecessary, unless when the operation is performed early. All that is required for the purpose is a small hand-glass to place over the cuttings, and a mat to shade them during bright sunshine. After they are well rooted, they must be taken carefully up, and planted in a bed previously prepared for them. They will then flower in great profusion from April to June.

Varieties are obtained from seed. In order to have them fine, considerable care is requisite in selecting the seed. It must always be gathered at those seasons when the plants flower in the greatest perfection, and from the best formed and largest blossoms. They will generally be found in this state in the early part of the season, from April to June, or in autumn, after the greatest heat of summer is past: at other seasons the flowers are smaller, and it is found that this affects the seed. The seed should be sown in spring, in light soil, with the protection of a cold frame. When the plants are very young, they must be removed from the frame, and planted thinly under hand-glasses, where they will remain until they are sufficiently strong to be planted out in the flower-garden. At every shifting they must have plenty of water, and be carefully shaded during bright sunshine.

HEAT. This great natural agent becomes sensible to us in the first instance by our bodily sensations, but we find afterwards its effects in the various changes which it is capable of producing on all substances. Expansion, fusion, evaporation, thermo-electric currents, and various physiological phenomena, are effects of heat, or at least accompany its absorption.

Every existing substance may be regarded as a source of heat. In this respect the sun is the most important natural source which our system possesses, its heat when condensed in the focus of a lens being exceedingly intense. When concentrated by a number of powerful lenses on one scale of a balance of extreme sensibility, no derangement of equilibrium ensues; as far therefore as experiment can inform us it is imponderable, and the increase or diminution of heat in any body is therefore unaccompanied by any alteration of weight.

Heat may be produced artificially by any means which propagate agitations internally in bodies: hence friction, hammering, percussion, sudden condensation, chemical combination, and electrical discharges are all proper to produce or rather to develope heat.

Heat radiates from all bodies in straight lines and in all directions, and in the law of its emanation it resembles light, its intensity diminishing in the same proportion as the sine of the angle of emanation. If we conceive two balls which are heated unequally to be inclosed by a concave surface which by any means is preserved at a uniform temperature, the radiation of heat from the warmer ball, directed on the colder, being more copious than the radiation from the latter on the former, the temperature of the hotter will sink, and of the cooler rise, in proportion to the difference of radiations, and this will continue until the temperatures become permanent, in which case the radiations are necessarily equal.

One consequence of the free radiation of heat in open space is that its intensity must vary inversely as the square of the distance from the origin. Hence every portion of space has a determinate temperature due to the amount of radiation, not only from the sun and fixed stars, but also of the non-luminous bodies of each system.

But, though the laws of the free emanation of heat and light are similar, those of their transmission through substances are very different. When

a metallic body is but a little heated in a fire, we have heat unaccompanied by sensible light; and in the lunar rays the light, though originally transmitted from the sun, arrives at our planet without any sensible heat, even when collected in the focus of a burning-glass. Again, a plate of glass placed before a common fire will intercept the heat until it becomes itself sufficiently heated to radiate. When however the source of heat is more intense, a small portion will be directly transmitted; while for the solar rays we find the heat is transmitted as well as the light. It is still more remarkable that, when the solar rays are decomposed by transmission through a glass prism, the differently coloured rays of the spectrum have each a different intensity of heat, the least refrangible possessing the greatest portion; the greatest heat is found at the place occupied by the extreme red rays, or even a little beyond them.

Not only may radiant heat be collected in a focus by refraction through a lens, but also by reflexion from a polished concave mirror.

The power of radiating heat is certainly the most universal mode of its propagation between different particles of matter, as well as through considerable spaces. However, it is usual, for greater simplicity, to designate this propagation through solid bodies as *propagation of heat by contact*. Whichever of these two views may be adopted, we are led to important physical distinctions between different homogeneous substances, viz. their conducting powers internally and externally. Newton's formula to represent the heat communicated from one body to another of the same physical nature, when in contact, is $h\,(t-t')$; in which t and t' are the temperatures of the two bodies, and h is a constant, proportional to the interior conductibility of the particular substance. A formula for the heat lost by a body of uniform temperature when subject to a current of air is $H\,(t-\tau)$, τ being the temperature of the air in contact, and H a constant, depending on the exterior conductibility.

The exterior conductibility may be very different in the same body by slight alterations in the smoothness or even colour of the surface. It is by this antagonist principle that heat acquires a permanent state corresponding to the different positions of the parts of bodies relative to the sources of heat and the dispersing surfaces.

The mathematical theory of the distribution of heat is founded on the principle that, when a body has arrived at a permanent state of temperature, the quantity of heat given out by any particle to the adjacent colder region must be equal to that received from the warmer particles near it, and conversely. For example, suppose a solid body to be contained by two parallel planes of indefinite extent, and of uniform but different temperatures. In this case, the exterior conductibility through the sides being prevented, the temperature will be uniform in any section of the body parallel to its bases, but will increase from the lower plane in an arithmetical progression to the upper. Now, suppose a thin cylindrical rod to be placed in a medium of which the temperature is constantly zero, while its extremities are maintained at constant but different temperatures; in this case, on account of the exterior conductibility, the distribution of heat will follow, at equal distances along the rod, a geometrical progression increasing from the colder extremity to the hotter.

The propagation of heat in liquids depends very little on any communication by contact. If we place a heated plate on the surface of water in a vessel, but so as not to touch the edges, a thermometer placed in the water will indicate little or no alteration of temperature; and, if the bottom of a vessel of water be heated, the heat will be distributed through the liquid only by currents of particles ascending from the heated part. Little as is the conducting power of liquids, that of gases is probably much less, if any; but there would be great difficulty in establishing this experimentally. The effect of heat on gases is to increase proportionally their elasticity, and this disturbing force produces violent motions in their parts, so that the whole shortly acquires a uniform temperature, when other forces, such as gravity, are not taken into consideration.

These three modes of the propagation of heat exist in our globe, and are the cause of important phenomena in the distribution of climate.

First, the great mass of the earth, considered in reference to its solid parts, has an external source of heat in radiation principally from the sun, which compensates the radiation from the interior of the earth. If we suppose the mass of the earth to have been at any remote period at a very high temperature, the effect of the radiation of its heat through the colder surrounding space would be to cool first the superficial strata, and successively, though in a less degree, the internal strata, until a permanent state was reached, when the diminished radiation would be exactly compensated from external sources. Hence, on descending below that comparatively shallow envelope affected with diurnal or annual variations of temperature, we ought to find a continually increasing temperature towards the centre, a result which has been verified in the mines in several countries in Europe.

The propagation of heat by motion in fluids has an immense tendency to equalise the temperatures of different latitudes; and the unequal depths of different places in the bed of the sea would, from the same cause, produce currents warmer than the adjacent water. The elasticity acquired by portions of the air in contact with the warmer regions of the globe destroys the equilibrium of that fluid, and generates winds of which the heat is communicated to the districts traversed, while the counter-currents, or cold winds, rush forward to occupy the abandoned spaces. [Trade Winds.]

Chemical Agency of Heat.—The agency of heat in promoting chemical action is important and extensive; in some cases no combination can take place without it, and in others it greatly facilitates chemical combination, while in some instances it decomposes compound bodies, and resolves them either into simpler or elementary forms of matter. In the solution of salt in water, an increase of heat, by increasing the affinity between the solid and the liquid, increases the solvent power. Many gases, on the contrary, are more soluble in cold

than in hot water. In the case of oxygen and hydrogen, and in many similar cases, heat has no effect on the mixture until it actually produces combination, with change of state. The action of oxygen upon metals very greatly depends upon the degree of heat.

There are some gaseous compounds which can scarcely be procured by the direct action of heat on their elements: thus oxygen and nitrogen do not unite, even when strongly heated, so as to form nitrous acid or any other compound; but the heat which accompanies the electrical spark seems capable of producing this effect. There are a few cases in which heat by direct action and without the aid of any intervening affinity is capable of decomposing compounds.

Heat has also great power in modifying as well as in causing chemical action, and different degrees of it produce very opposite effects in some cases. If we heat mercury to about its boiling point exposed to the air, it becomes per-oxide; but, if we expose this product to a higher temperature than was required for its formation, it is then again resolved into metallic mercury and oxygen gas.

The dilatation of substances by heat is nearly proportional to the increase of temperature, except when they are about to change their physical or chemical states; thus water near the freezing point expands when the temperature is diminished, which is probably owing to the different arrangement assumed by its constituent particles preparatory to crystallisation. In gases the law is very simple; their expansion (even when containing vapour) is 0.375 of their volume at the freezing point, when their temperature is raised to the boiling point; and is equable during the interval.

The following table gives the dilatation of a unit length of different solids from the freezing to the boiling point, and is a *mean* taken from several observers:—

Glass tube	.00083	Copper	.0017
Crown glass	.00089	Brass	.0018
Platinum	.00093	Silver	.0020
Palladium	.001	Tin	.0022
Cast iron	.0011	Pewter	.0023
Steel	.0012	Grain tin	.0025
Do. tempered	.0013	Lead	.0028
Gold	.0015	Zinc	.0030

Several instruments have been constructed to measure heat. One of these, the *Calorimeter*, measures the capacity of a body for caloric, or its specific caloric. The body to be tested is placed in the innermost of three concentric vessels, the two outermost containing ice. The quantity of water produced by the cooling of the body determines the specific caloric. This instrument was invented by Lavoisier. In a calorimeter invented by Count Rumford water is used, and the specific caloric of the body is determined by the number of degrees which the temperature of the water is raised by the cooling of the body. The thermometer measures variations of temperature to about 650° Fahr. [THERMOMETER.] To measure degrees of heat still higher, the pyrometer is used. [PYROMETER.]

HEAT, ANIMAL. The conversion of the food of man and the higher animals into nutriment for the body is attended with changes which produce an evolution of heat which constantly maintains the temperature of an animal at a point above or below, according to circumstances, the temperature of the medium in which it exists. The degree of heat possessed by animals not gifted with the power of locomotion is very small above that of surrounding media, and in this respect resembles the heat given off by plants. [HEAT OF VEGETABLES.] In proportion as animals possess the power of locomotion, they evolve heat from their bodies. This arises from the fact, that where the muscular system is most exercised there is greatest demand made upon the nutritionary processes going on in the system. We should therefore expect to find that the quantity of heat developed in the invertebrate animals was less than that in the vertebrate class. This fact has been recorded by many observers, as, for instance, by John Hunter, in the Annelida, and by Newport, in the Insecta.

Amongst the vertebrate animals, fishes and reptiles have the lowest temperature. Dr. Davy, John Hunter, and others, have found that fishes have a temperature of from 0.7° to 2.7° above the surrounding medium.

In man the temperature of the accessible parts of the body, as the mouth, axilla, &c., is usually between 97.7° and 98.6°. The human blood is found to have a temperature in health varying from 100.6° to 101.75°; in disease it rises to 106° or 109°. In healthy persons the temperature is said to attain its maximum during the day, and to fall from 1.8° to 2.7° during sleep. Dr. Davy has also found that the temperature of the interior of the body is 2.7° to 3.6° higher in tropical than in temperate climates. Most of the mammalia have a higher temperature than man, and birds develope a greater quantity of heat than any other class of animals. This arises from the nutritionary changes going on in the bird in order to support the enormous muscular power which it is compelled to exert during flight.

There is now no question that the cause of animal heat is the chemical changes which are going on in the nutrient fluid of the body. During the act of respiration a large quantity of oxygen gas is taken into the lungs, which is absorbed by the blood. In this fluid it meets the various compounds of carbon which have been taken in with the food; and the consequence is a union of the oxygen with the carbon, and the formation of carbonic acid gas, which gas is given out when the blood again reaches the lungs during expiration. When carbon and oxygen unite out of the body, heat is the result, and the same thing occurs when they unite in the body; and it is through the medium of this change that the bodies of animals are raised to a given temperature by the circulation of the blood through the system. It has been calculated that there is more oxygen absorbed than is given out of the system in the form of carbonic acid gas; it is probable that this enters into combination with hydrogen and compounds of hydrogen, nitrogen, and carbon, and thus contributes to the raising of the animal heat.

This theory of animal heat explains many well-known phenomena; as, for instance, the slight

independent warmth of the fœtus, and of those young animals which are born in an imperfectly developed condition. The low temperature of persons with *morbus cæruleus* [HEART, DISEASES OF], where the blood is only imperfectly oxygenated, and the cold experienced by aged and debilitated persons in whom a small quantity of blood circulates slowly; as also the increased temperature observed in persons labouring under attacks of inflammatory disease, where the blood circulates rapidly, are also confirmatory facts. The phenomena also exhibited by the *hybernation* of animals are explained by this theory.

HEAT OF VEGETABLES. Whenever oxygen combines with carbon to form carbonic acid, an extrication of heat takes place, however minute the amount. Such a combination occurs much more extensively during the germination of seeds and the impregnation of flowers than at any other time. At the first of these periods extrication of heat takes place to a considerable amount, as is remarked in the germination of barley heaped in rooms, previously to being manufactured into malt: in the latter it also occurs, but, in consequence of flowers not being confined in close cases, the heat is lost as soon as it is disengaged, and never accumulates, except in a few special instances. It is however only when large quantities of flowers expand within close cases that this phenomenon is particularly remarkable. Accordingly, in the spathe of araceous plants it has been remarked at its greatest intensity. Lamarck, Senebier, and De Candolle found the flowers of *Arum maculatum*, between three and seven o'clock in the afternoon, as much as 7° Réaum. warmer than the external air. Schultz found a difference of 4° to 5° between the heat of the spathe of *Canadium pinnatifidum*, and the surrounding air at six to seven o'clock P.M. Hubert and Bory de St. Vincent assert that at sunrise the spathe of *Arum cordifolium* acquires in the Isle of France an elevation of 30° Réaum. above the atmosphere. Finally, Messrs. Vrolik and Vriese at Amsterdam, and Adolphe Brongniart at Paris, have confirmed the fact by new observations in the hothouses of those cities. It has also been found that in winter plants have a higher temperature than the surrounding atmosphere, and in summer a lower one.

Hence it appears that plants not only have, under all circumstances, a temperature different from that of the external air, being warmer in winter and cooler in summer, but that under particular circumstances the heat of certain parts is elevated in a very remarkable degree. We know that heat is necessary for germination and for vegetable impregnation. May we not therefore conclude that nature has given to plants the power of extricating for themselves an additional supply of caloric at these important periods?

HEATH. [CALLUNA; ERICA.]

HEATH-COCK. [BLACK-COCK.]

HEBER, REGINALD, second bishop of Calcutta, was born April 21, 1783, at Malpas, in Cheshire, of which place his father was for many years co-rector. He gave early indications of his poetical talents, and at seven years old he had translated Phædrus into English verse. At eight he was sent to the grammar-school of Hawkhurst under Dr. Kent, and in his thirteenth year he was placed in the school of a clergyman near London. He remained here about three years, and in November 1800 was entered at Brasenose College, Oxford. In his first year at the university he gained the prize for Latin verse. In the spring of 1803 he wrote his prize poem, 'Palestine,' which has obtained a permanent place in English literature. In 1804 he became a fellow of All Souls. The year after he had taken his degree he gained the Bachelors' prize for an English prose essay on the 'Sense of Honour.' About the middle of 1805, in company with his friend Mr. John Thornton, he set out on a continental tour, and returned to England in October 1806. In 1807, before he had obtained his degree of M.A., he took orders, and was instituted by his brother Richard to the family living of Hodnet. In April 1809, he married Amelia, youngest daughter of Dr. Shipley, dean of St. Asaph. While discharging the duties of his parish with much earnestness, he was ardently attached to the pursuits of literature. He was a frequent contributor to the 'Quarterly Review,' from its commencement. In 1812 he commenced the preparation of a 'Dictionary of the Bible,' but other duties compelled him to suspend this work, and no part of it was ever published. In the same year he published a small volume of 'Poems and Translations for Weekly Church Service.' The composition of his 'Hymns,' with a view of improving the psalmody and devotional poetry used in churches, was also a favourite recreation. His political views were those of the High Church and Tory party, but devoid of all bitterness. In 1815 he was appointed Bampton lecturer, and the subject he selected was 'The Personality and Office of the Christian Comforter.' In 1817 Dr. Luxmore, the bishop of St. Asaph, appointed Heber to a stall in that cathedral. In 1819 he edited the works of Bishop Jeremy Taylor. His other works consist of 'Parish Sermons,' preached at Hodnet, and Sermons preached in India. In April 1822, he was elected preacher of Lincoln's Inn. At the end of that year his friend and connection, the Right Hon. Charles W. Williams Wynn, who was at the time President of the Board of Control, offered him the vacant see of Calcutta, which he accepted after two refusals. He embarked for his diocese, June 16, 1823, and on the 15th of June, 1824, began his visitation. The Journal which he kept during his visitation, and which has been published in three octavo volumes, shows the extent of his observations. On the 3rd of April, 1826, after investigating the state of the mission at Trichinopoli, he retired to use a cold bath, in which he was found dead about half an hour afterwards. Within less than three weeks he would have completed his forty-third year.

HEBERDEN, WILLIAM, M.D., was born in London in 1710. In 1724 he was sent to St. John's College, Cambridge, of which, six years afterwards, he was elected a fellow. He studied medicine in Cambridge and London, and after taking his degree practised as a physician, and delivered an annual course of lectures on materia

medica in the university of Cambridge. In 1746 he was elected a fellow of the Royal College of Physicians, and soon after left Cambridge, and commenced practising in London, where he at once met with the greatest success, and obtained the highest reputation. In 1750 he was elected a fellow of the Royal Society, and in 1778 an associate of the Royal Society of Medicine in Paris. After thirty years' extensive practice, finding his health declining, he gradually withdrew himself from his profession to retirement at Windsor, where he died in 1801.

HEBRADENDRON, a genus of the natural family of *Guttiferæ*, established for the Gamboge Tree of Ceylon.

The gamboge of Siam is in cylinders, either solid or hollow, usually called *pipes:* it is supposed to have this form from being so rolled, or from being poured into the hollow of bamboos.

The Ceylon gamboge is usually considered inferior to that sent from Siam. No doubt however some of very excellent quality is produced in Ceylon by the tree which has been called *Hebradendron cambogioides*. Dr. Graham ascribes its inferiority to want of care in preparing the article for market.

The *H. cambogioides* forms a moderate-sized tree. The gamboge oozes out in a semi-liquid state, but hardens on exposure to the air, and is scraped off by the collectors next morning. This tree is found in various parts of Ceylon. Its favourite abode seems to be low sandy ground, but it is also found 100 miles inland, at so high an elevation as 2000 feet above the sea.

HEBREW LANGUAGE forms a branch of that extensive family of languages which are known by the name of Semitic; a name which is derived from the real or supposed descent of the people who speak those languages from Shem, the son of Noah. The Semitic languages may be divided into three branches: the Arabic, to which the Ethiopic is closely allied; the Aramæan, consisting of two dialects—the Babylonian or East Aramæan (sometimes but erroneously called Chaldee), and the Syriac or West Aramæan; and the Hebrew, to which the Phœnician and Punic are closely related. Of these languages the Arabic is the most copious, and the Aramæan the poorest and least developed; the Hebrew holds an intermediate rank between these, being more perfect than the Aramæan, and inferior to the Arabic.

The Hebrew language derived its name from the Hebrews, who date their origin from Abraham, who is called 'the Hebrew' in Gen. xiv. 13. The etymology of this word is doubtful.

The Hebrew language appears to have been formed in Palestine by a union of the ancient Aramæan, which was brought by the Abrahmites from Mesopotamia, with the Phœnician or Canaanitish, the language of the original inhabitants of the country. That the Phœnician and Hebrew languages were very closely allied is evident from the Phœnician names of persons and places, and from the specimens of the Phœnician language which we possess in coins and inscriptions. The long settlement of the Hebrews in Egypt, and their forty years' wandering in the wilderness, must have had an important influence upon their language; but the number of Egyptian words received into it appears to have been small.

Many critics have divided the history of the language into four periods:—I. From Abraham to Moses. II. From Moses to Solomon. III. From Solomon to the Babylonish captivity. IV. From the Babylonish captivity to its final extinction as a spoken language. But there are in reality only two periods in which any difference can be traced in the language; the first extending from the time of Moses to the reign of Hezekiah, and the second from the reign of Hezekiah to its final extinction as a spoken language. The language in which the Pentateuch is written differs so little from that of David, Solomon, and Isaiah, who lived many centuries after the time of Moses, that many critics, supposing it impossible that a language should have remained stationary for so many centuries, have maintained that none of the books of the Old Testament were written previous to the time of David and Solomon. It is not very easy to disprove this opinion; but the remarks of Ewald on this subject appear worthy of attention. He observes in his 'Hebrew Grammar,' § 7 (Eng. trans.), that 'the Hebrew language in the first four books of the Pentateuch, which contain records of unquestionable antiquity, partly by Moses or from his time, appears already, a few minutiæ excepted, fully developed.'

The conquests of the Assyrians and Chaldæans from about B.C. 720 tended to introduce the Aramæan language into Palestine. The Aramæan colonies (2 Kings, xvii. 24), which were planted in the kingdom of Israel to supply the place of the Israelites who had been carried into Assyria by Shalmaneser, must have caused the spread of the Aramæan language in the northern parts of Palestine even before the destruction of the kingdom of Judah. The long residence of the Jews in Babylon after the destruction of Jerusalem by Nebuchadnezzar caused the extinction of the Hebrew as a spoken language, at least among the common people. After their return to Judæa, according to the edict of Cyrus, it appears, from a passage in Nehemiah (viii. 8), that the common people did not understand the Scriptures when read to them in the Hebrew language. But Hebrew continued to be spoken by the upper classes for a considerable time after the Babylonish captivity. The prophecies of Haggai, Zechariah, and Malachi, who lived in the latter part of the sixth century B.C., are written in tolerably pure Hebrew. The inscriptions of the coins of the Maccabees are in Hebrew; and the Hebrew language does not appear to have been discontinued in writing and conversation among the upper classes till the century preceding the birth of Christ.

But the Hebrew, from the period of its extinction as a spoken language, has been always more or less cultivated by the Jews. After the destruction of Jerusalem by the Romans, numerous schools were established by the Jews, in which their language and literature were taught. Of these schools the most celebrated were those of Tiberias and Babylon. The Mishna, which contains the traditions of the Jews and interpretation

of the Scriptures, is supposed to have been compiled in the latter part of the second or the beginning of the third century, by Rabbi Jehuda. The Mishna was considered from this period one of the principal works of Hebrew literature, and the Rabbis of Tiberias and Babylon wrote numerous commentaries upon it. These commentaries were at length collected into two separate works, which were entitled the Jerusalem and Babylonian Talmuds.

The Christians paid very little attention to the Hebrew language before the Reformation. The publications of the Buxtorfs in the seventeenth century tended to diffuse the language among Christians. The Grammar of Schultens, which appeared in 1731, and which may still be consulted with great advantage by Hebrew scholars, contained a much clearer development of the principles of the language than the Buxtorfs had given. His knowledge of Arabic enabled him to compare the forms of that language with the Hebrew, and thus to draw the attention of scholars to the important fact that the study of the cognate languages is necessary to obtain an accurate knowledge of Hebrew. But the publications of Gesenius and Ewald, in the present century, have done more to facilitate the acquisition of the language than the works of all preceding writers.

Few literary subjects have occasioned greater discussion than the letters, vowels, points, and accents of the Hebrew language. But, with regard to the letters, it appears probable that the present square characters in which Hebrew is written were not employed previous to the Babylonish captivity, but that the Phœnician letters were used, which are still preserved with a slight alteration in the Samaritan alphabet. According to the Jewish tradition, the present square characters, which belong to the East Aramæan language, were first introduced by Ezra when he revised the canon of Scripture; but they could not have been universally adopted till a later period, since the Samaritan Pentateuch, which was not introduced into Samaria till after the Babylonish captivity, was written in the ancient character, and the Asmonæans in the second century before Christ have also used the same character on their coins.

It is a characteristic of the Hebrew language, according to the system of most modern Hebrew grammars, that the alphabet consists only of consonants, and that the vowels are expressed by means of small points placed above and below the letters. The antiquity of these points has occasioned great controversy among the learned. It appears certain from many circumstances that the Hebrew letters were originally written without points. The best arguments on both sides of the question are given in Buxtorf's 'Tiberias, sive Commentarius Masorethicus,' 4to., 1620, in which the antiquity of the points is maintained, and in Capellus's 'Arcanum Punctationis revelatum,' 4to., 1624, in which their antiquity is denied.

Further information respecting the Hebrew language and literature is given in Hezel's 'Geschichte der Hebr. Sprache und Litteratur,' 8vo., Halle, 1766; Kopp's 'Bilder und Schriften der Vorzeit,' 1820–1; Gesenius's 'Geschichte der Hebr. Sprache und Schrift,' 8vo., Leip., 1815; Lowth's 'De Sacri Poesi Hebræorum;' best edition by Michaelis, 2 vols. 8vo., Gött., 1768–9: this work has been translated into English by Gregory; Herder, 'Geist der Hebraïschen Poesie,' best edition by Justi, 2 vols. 8vo., Leip., 1825: this work has been translated into English by Marsh, Burlington, U.S., 1833; Bellermann, 'Versuch über die Metrik der Hebräer,' 1813; Saalschütz, 'Von der Form der Hebr. Poesie,' 8vo., 1825; the introductions to the Old Testament by Eichhorn, Jahn, De Wette, and Augusti: Hurwitz, 'Hebrew Tales, selected and translated from the Writings of Ancient Hebrew Sages; to which is prefixed an Essay on the Uninspired Literature of the Hebrews,' 12mo., Lond., 1826. A review of the most important Hebrew grammars and lexicons is given in Nos. 9, 11, and 13 of the 'Journal of Education.'

Those who are commencing their Hebrew studies without the assistance of a master will find the following works useful:—Leusden's 'Clavis Hebraica Veteris Testamenti,' 4to., Utrecht, 1683; Robertson's 'Clavis Pentateuchi,' 8vo., Edinb., 1770, reprinted at Norwich, 1824; Bythner's 'Lyra Prophetica, sive Analysis critico-practica Psalmorum,' reprinted at Glasgow in 1823; Meisner's 'Nova Veteris Testamenti Clavis,' 8vo., Leip., 1809; Reay's 'Narratio de Josepho,' Oxf., 1822; Olivant's 'Analysis of the Text of the History of Joseph, upon the principle of Professor Lee's Hebrew Grammar,' 8vo., 2nd ed., Lond., 1833; Greenfield's 'Book of Genesis in English-Hebrew; accompanied by an Interlinear Translation, Philological Notes, and a Grammatical Introduction,' 8vo., Lond.

HEBREWS. [JEWS.]

HEBREWS, EPISTLE TO THE, a book of the New Testament. There has been much controversy as to whether this book is an epistle or a dissertation; as to the persons to whom it was addressed; and by whom and in what language it was written. It is not necessary to enter into the details of these controversies, and we shall only state the prevailing opinions. The allusions to particular circumstances (v. 11; vi. 9, 10; x. 32, 34; xiii. 19, 22, 23) tend to prove it to be an epistle. The general opinion respecting the persons to whom this epistle was addressed is that they were the Jewish converts in Jerusalem or Palestine generally. This opinion, as Michaelis has shown, is supported by the contents of the book itself. Concerning the language in which this epistle was written critics have been much divided, some supposing that it was written in Greek, and others that it was written in Hebrew and translated into Greek.

The author of this epistle is equally uncertain. The general voice of tradition assigns it to the Apostle Paul, but it has also been ascribed to Barnabas, to Luke, to Silas, and to Apollos. In the first ages of the church it appears to have been generally considered as a production of the Apostle Paul. The chief objections against the Pauline origin of the epistle are drawn from the absence of the usual address at the beginning,

the superiority of the style to that of Paul's acknowledged epistles, and the resemblance between its style and that of the Alexandrine school. The points above stated are discussed with great ability and candour by Prof. Moses Stuart ('Commentary on the Hebrews') in favour of the Pauline origin of the epistle, and Prof. Bleek ('Brief an die Hebräer') on the other side. The opinions which assign the authorship to Barnabas, Apollos, Luke, and Silas rest on very slight grounds.

The date depends partly on the settlement of the former question. If Paul was the author, it was probably written during his first imprisonment at Rome, and immediately before he was released (see xiii. 18, 19, 23). Accordingly most critics refer it to A.D. 61 or 62. In warmth of feeling, elegance of language, and force of argument, this epistle yields to no book of the New Testament.

HEBRIDES, or *Western Islands*, are scattered in the Atlantic Sea, along the western coast of Scotland, between 55° 35′ and 59° N. lat., and 5° and 8° W. long. They amount to nearly 200, of which about 80 are inhabited. They are usually divided into the Inner Hebrides and Outer Hebrides. The Inner Hebrides consist of the islands nearest the main land, including, besides those in the Frith of Clyde, Skye, Mull, Islay, Jura, Coll, Rum, Tiree, &c. The Outer Hebrides, popularly called the Long Island, consist of the range of islands stretching in a continuous E.N.E. and S.S.W. direction from Barra Head to the Butt of Lewis. The principal islands in the range are Barra, South Uist, Benbecula, North Uist, and the districts of Harris and Lewis, which two form together one long island. The surface of these islands varies considerably. Some of the larger islands, especially those which approach the main land, are mountainous, such as those of Arran, Jura, Mull, and Skye, in which the elevated masses rise to the height of 2000 or 3000 feet and more above the sea. The rest are in general only hilly, the most elevated parts not exceeding 1500 feet; and in a few of them the hills do not rise to more than 300 or 500 feet. The rivers are small, but numerous, and all of them abound in salmon, trout, and eels; many of them contain also several other kinds of fish. Some of the islands abound in lakes. Bute and Islay are considered fertile, and also several districts in the island of Skye. A comparatively small portion of the surface of the whole is under cultivation. The whole area of the islands comprehends about 2740 square miles, or 1,688,960 acres, of which about 64,000 are fresh-water lakes. There are no natural woods on the islands, but about 5000 acres have been planted.

The climate is upon the whole mild. Frost and snow are almost unknown in the smaller isles, and they seldom prevail in the larger to any considerable degree.

The great mass of the population resides within a mile of the sea-shore. From their language and customs it is evident that they are of the same stock with the inhabitants of Ireland and of the Highlands of Scotland.

The Hebrides belong politically to four Scotch counties. Those of them which lie in the Frith of Clyde, between the peninsula of Cantire and the coast of Ayrshire, constitute a county by themselves. [BUTESHIRE.] All the other Southern Hebrides, together with the islands of Muck, Rum, and Canna, which are included in the Northern Hebrides, are annexed to the county of Argyle. [ARGYLESHIRE.] The Long Island, except Lewis, constitutes a part of Inverness-shire. Lewis is a part of Ross-shire; and Skye belongs to Inverness.

HECATÆUS of Milétus, was one of the earliest Greek prose writers. He was present at the deliberation of the Ionians (B.C. 501), and attempted to dissuade them from revolting against the Persian king. (Herod., v. 36.) He is also mentioned by Herodotus (v. 125) as being alive at the time of the flight of Aristágoras, B.C. 497.

His works, which consisted of histories, genealogies, and geographical pieces, were held in considerable esteem by the ancients. Herodotus (vi. 137) quotes one of his historical works.

The fragments of the writings of Hecatæus have been published by Creuzer in his 'Historicorum Græcorum Antiquissimorum Fragmenta,' 8vo., Heidel., 1806, and by Klausen, 'Hecatæi Milesii Fragmenta,' 8vo., Berl. 1831.

HE'CATE, one of the ancient Greek divinities, the daughter of the Titan Perses and Asteria, according to Hesiod ('Theog.,' 411). Her attributes correspond in most respects with those of Artemis; and it has therefore been conjectured that she may originally have been the same as Artemis.

HECLA. [ICELAND.]

HECTOR, the greatest of the Trojan heroes who figure in our accounts of the Trojan War. He was the son of Priam and Hecuba, and married to Andrómache. The poet of the 'Iliad' describes him not only as a bold and gallant warrior, but as a hero ennobled by all the more tender and humane virtues. The most tender passage in the 'Iliad' is that in which Hector (vi. 369, &c.) before going to battle, takes leave of his wife and child. He finally fell by the hands of Achilles, and the body was given up by the conqueror to his father Priam. The remains of Hector were buried at Troy, where funeral sacrifices were offered to Hector as a hero.

HE'DERA, a genus of araliaceous plants, consisting of nearly fifty species, inhabiting chiefly the warmer parts of the world, is interesting to Europeans as containing, among others, the common Ivy with its numerous varieties. This plant, the *Hedera helix* of botanists, does not exactly represent the habit of the genus, for many of the exotic species, instead of being creepers, adhering to other plants, or to rocks and walls by their sucker-like roots, are trees of considerable size.

HEDGE, one of the most lasting and effectual of fences. Hedges are made of various kinds of shrubs and trees, trained so as to throw out numerous branches along the stem from the surface of the earth upwards; this is done by judicious pruning when they are young. The head being cut off and the side branches shortened, numerous smaller branches spring out, which

shortened in their turn, and form a very compact mass, consisting of the ends of stumps and branches pointing in every direction. Those shrubs which are of a thorny nature are best adapted for hedges. Holly, which bears prickles on the edges of the leaves, is on this account by far the best shrub to form a hedge; but yew, box, thorn, hornbeam, elder, sweetbriar, prickly pear, and privet are all employed for hedges, each having its particular excellencies, and requiring a particular kind of culture.

In order to have a good hedge, the shrubs should be planted in a soil which is naturally strong, but well pulverised, and in which no shrub or tree has lately grown. The usual mode is to insert, in the early part of the spring, two or three rows of quicksets in the side of the bank, on a level with the surface of the ground, where a sod has been turned over, and forms the base of the bank raised by the earth taken out of the ditch. This quickset requires to be protected from cattle or sheep by some fence. The shoot should be allowed to grow to its full extent the first and second year; the root will then have struck deep into the ground; and in the third or fourth year the quicksets may be cut down to a few inches. They will then send out several fresh and strong shoots, which may be cut and pruned to the height and width of the intended hedge. The necessity, or otherwise, for a ditch depends on the nature of the soil.

When a hedge has been left uncut for several years, it grows wide and high. It requires to be cut down once in seven or eight years; in this case much care is required in the cutting that the shoots may grow out again regularly. In renewing a hedge, or repairing gaps in an old one, it is necessary to remove the old earth and put in new for the reception of the young quicksets.

There is a method of repairing hedges which is called *plashing*. It consists in cutting half through some of the stems near the ground, and then bending the upper parts down in a horizontal or oblique position, keeping them so by means of hooked sticks driven into the bank. Thus a live hedge is made, which fills up the gaps in the same manner as a dead hedge would have done, and the bent stems soon throw out shoots. But this should only be done when the stems are young.

HEDGEHOG (*Erinaceus*, Linn.) has the body covered with sharp strong prickles instead of hairs. The skin of the back is furnished with muscles so arranged that the animal, on bending its head and pressing its limbs upon the belly, can close itself up like a purse, and present on every part its spines to the enemy. The tail is very short. All the feet have five toes. In the upper jaw there are six incisors, of which the middle ones are the largest; in the lower, two incisors; on each side three false molars; three molars with bristling points; and a little tuberculous molar. The genus *Erinaceus* may be regarded as typical of the order Insectivora. It is spread over Europe, Asia, and Africa.

Example, the common Hedgehog (*Erinaceus Europæus*), the *Riccio* of the Italians, *Erizo* of the Spanish, *L'Hérisson* of the French, *Igel* of the Germans, *Hedgehog* and *Urchin* of the English, *Echinus terrestris* of Gesner, *Echinus* (*Erinaceus*) *terrestris* of Ray, and *Acanthion vulgaris* of Klein. There can be little doubt that it is the Echinus (Ἔχινος) of Aristotle.

The hedgehog is too well known to need here any explicit details. It is insectivorous, but also devours slugs, frogs, small snakes, and eggs, being therefore mischievous in game preserves. It is plantigrade; inhabits copses, woods, and thick hedgerows; is nocturnal; and hybernates. The female makes a nest, and produces in summer from two to four young, blind at their birth, with the soft rudiments of the prickles only just apparent. On the continent in many places the flesh of this animal is eaten. The Romans used its prickly skin for hackling hemp. Many ridiculous stories are related respecting the hedgehog, which being credited by the ignorant have conduced to its general persecution. For more ample information see 'Bell's History of British Quadrupeds,' and the 'Pictorial Museum of Animated Nature,' vol. i. p. 235.

The foreign species are rather numerous. (See 'Proceeds. Zool. Soc.,' 1832.)

The Tenrecs or Tanrecs of Madagascar and Mauritius (gen. *Centetes*) are allied to the Hedgehogs ('Proceeds. Zool. Soc.,' 1831 and 1838), as are also the genus *Ericulus* of M. Isidore St. Hilaire, and the genus *Echinops*, Martin, in 'Trans. Zool. Soc.,' vol. ii. p. 249. These genera are both peculiar to Madagascar.

HEDY'SARUM, a genus of plants belonging to the natural order *Leguminosæ*. The species are herbs or under-shrubs. *H. coronarium*, French Honeysuckle, is a native of Spain and Italy. It has deep red or white flowers. In Calabria this plant grows wild in great abundance, and horses and mules are fed with it. It grows well in our gardens, but probably would not make a good field crop. *H. fruticosum* is a native of Siberia in sandy places. It has a pale purple flower, and is a very handsome plant. Horses eat it with avidity, and it may be made useful in fixing sand, in which it grows readily. *H. Mackenzii* is a native of arctic America, about the Saskatchewan. The flowers are large and of a red colour. This was described as a liquorice plant by Sir A. Mackenzie, and named after him. The whole plant has a sweet taste. *H. lineare* is used in Cochin-China as a stomachic, and *H. alpinum* is used in Siberia for the same purpose. The *H. sennoides* of Willdenow, now *Ormocarpum sennoides*, has a root which is used in India as a tonic and stimulant. The *H. alhagi* of Linnæus is the *Alhagi maurorum* of recent writers. It is a spiny shrub, and from its branches exudes a sweet substance like manna. *H. tuberosum* of Roxburgh, *Pueraria tuberosa* of De Candolle, grows in the Circar Mountains, Hindustan.

HEEM, JAN DAVITZE DE, one of the most distinguished of the Dutch fruit and flower painters, was born at Utrecht about 1600, and died at Antwerp in 1674. His son, Kornelis, or Cornelius, was likewise an excellent painter in the same department.

HEEMSKERK, MARTEN, a celebrated

Dutch painter, was born at Heemskerk, near Haarlem, in 1498: he was the son of a peasant farmer, Jacob Willemsze Van Veen, but he is known only by the name of his birth-place. Marten was employed by his father in common farm labour, which was particularly distasteful to him. He had given evidence of a talent for the art of design, and he fled to Delft, obtained admission into the house of a painter of the name of Jan Lucas, and he too became a painter. He studied afterwards with Jan Schoorel, at Haarlem, and his earliest works of distinction were painted in the style of that master. He painted for some years at Haarlem with great success. In Rome he distinguished himself as an imitator of Michel Angelo; the jealousy of the Italians, however, forced him to return to his own country. There are scarcely any works by Heemskerk now at Haarlem. There is a Last Judgment by him at Hampton Court, and there are several of his earlier works in the Pinakothek at Munich, which however show that he was not one of the best of the Van Eyck school. He died very rich, and, though twice married, childless, at Haarlem, in 1574. The engravings after his works, by various masters, amount to many hundreds.

HEERE, LUCAS DE, a distinguished painter and poet, was born at Ghent in 1534. His father, Jan de Heere, was a good sculptor, and his mother excelled in miniature-painting. Lucas was placed with Francis Floris, after he had made sufficient progress with his father to benefit by the instruction of Floris.

De Heere painted in France; and he was in England in the reign of Queen Elizabeth, whom he painted several times. There is a flattering allegory of her by him at Hampton Court.

The principal of Lucas's poetical works was the 'Garden of Poetry,'—'Boomgaard der Poësijë:' he commenced also, in verse, the 'Lives of the Painters,' but this is lost. He died at Ghent in 1584.

HEEREN, ARNOLD HERMANN LUDWIG, was born at Arbergen, a village near Bremen, on the 25th of October, 1760. His father, who was pastor at Arbergen, gave him his first instruction in religion, Latin, and mathematics. In the autumn of 1779 he went to the university of Göttingen, when he attended Heyne's philological lectures. However he soon felt that philology, in the narrower sense of the term, was not his vocation, for the things about which he read in the ancients interested him more than the languages themselves. In 1784 Heeren took his degree of doctor in philosophy. In the year following he formed the plan of a new edition of the 'Eclogæ' of Stobæus. He had commenced giving lectures at Göttingen as private teacher, but the opposition between his actual pursuits and what he felt to be his vocation became more and more painfully felt, his spirits began to fail, and his health also began to sink. He resolved to visit Italy, and principally Rome. One of the main objects of this journey was to collate the various MSS. of Stobæus. His stay in many of the principal towns of Germany, France, and Italy was of great advantage to him. The future historian became acquainted with the world at large; he saw with his own eyes some of the countries to whose history a great part of his future life was to be devoted. On his return to Göttingen in 1787, he was appointed professor extraordinary in the philosophical faculty, and henceforth his life flowed undisturbed by any changes of fortune. Being possessed of wealth, he was enabled to continue his philological and historical studies without anxious cares. In 1796 he married a daughter of Heyne, who remained his devoted and sympathising companion throughout his life. In 1799 he was appointed ordinary professor of history, as the successor of Gatterer. His reputation as a scholar and historian was already established, for the first two volumes of his Stobæus had appeared in 1792 and 1794 (the third and last was published in 1801). In 1793 and 1796 he had published the first two volumes of his 'Ideen über die Politik, den Verkehr, und den Handel, der vornehmsten Völker der alten Welt' (the third and fourth volumes appeared in 1812 and 1815), which is his principal work, and the one on the completion of which he looked as the main object of his life. A fifth edition, in 5 vols., appeared in 1824, &c. In 1799 he published the first edition of his manual of ancient history ('Handbuch der Geschichte der Staaten des Alterthums'). A fifth appeared in 1826. In addition to these works, which followed one another in rapid succession, he had for some years been editing, conjointly with his friend Tychsen, a journal on ancient literature and art ('Bibliothek der alten Literatur und Kunst'), and had written a great variety of essays for other periodicals, and for the 'Transactions of the Royal Society of Göttingen.' His activity was astonishing; and, in addition to all this, he began about the year 1800 to study the history of the middle ages and of modern times, and also lectured upon these subjects. A great work of his, relating to the history of modern times, bears the title of 'Handbuch der Geschichte des Europäischen Staatensystems und seiner Kolonien,' Göttingen, 1809: a fourth edition appeared in 1822. A work on the influence of the Crusades ('Sur l'Influence des Croisades,' Paris, 1808) was crowned by the Academy of Inscriptions. A collection of his minor historical works, in 3 vols. ('Kleine Historische Schriften'), appeared from 1803 to 1808, and another, embracing all his historical works, in 15 vols., from 1821 to 1826. Most of his works have been translated into English and Dutch. On the death of Eichhorn, in 1827, he undertook the editorship of the 'Göttingische Gelehrten Anzeigen.'

In 1827 or 1828 Heeren, in conjunction with Ukert, formed the plan of editing a series of works, containing the histories of the states of Europe. The whole is not yet completed; but among these works there are some of the highest eminence, such as Lappenberg's 'History of England,' and Geijer's 'History of Sweden.' Heeren died at Göttingen, on the 6th of March, 1842.

The great merits of Heeren's works, especially of those relating to antiquity, are these: they are usually the result of a diligent study of the ancient writers themselves, and represent the nations in their political and commercial relations in a very

lively manner. His works are written in a clear style, and the influence which they have exercised is very considerable. His works are not indeed without their defects, and many of them no longer satisfy the demands of our age.

HEGEL, GEORG WILHELM FRIEDRICH, was born at Stuttgart on the 27th of August, 1770, and was educated at the gymnasium of his native city. At the age of 18 he proceeded to Tübingen to join the classes of theology and philosophy, where he had for his class-fellow the illustrious Schelling. Dissatisfied with the prevailing system of metaphysics, Hegel sought to supply its deficiencies by the works of Plato, Spinosa, and Kant; and, in the conviction that a truly philosophical comprehension can only be educed by an enlarged and diversified inquiry, he combined with a knowledge of philosophy a profound acquaintance with the natural and political sciences. Upon being admitted to the degree of doctor in philosophy, he accepted an engagement as private tutor, in which capacity he lived for some years, first in Switzerland, and afterwards at Frankfort-on-the-Main, until, on the death of his father in 1800, he was enabled, by the inheritance of a small patrimony, to devote himself without restraint to the study of philosophy. He accordingly proceeded to Jena, where Schelling was teaching his system of *Absolute Identity*, and of which Hegel was at this period one of the warmest partisans. Here he wrote his first philosophical work, entitled 'On the Difference of the Systems of Fichte and Schelling;' which treatise, notwithstanding the sincerity with which Hegel then advocated the views of the latter, contained the germ of that dissent which was afterwards expanded into a peculiar theory. He was also associated with Schelling in conducting the 'Critical Journal of Philosophy;' and among the most important of the articles contributed by him is that 'On Faith and Science.' In 1806, when Schelling went to Würzburg, Hegel was appointed to supply his place as lecturer. The duty of communicating his views to others necessarily imparted to them distinctness and precision; and now for the first time Hegel openly avowed his dissatisfaction with the system of Schelling. The difference between the ideas of the master and disciple was marked still more strongly in the 'Phenomenology of Mind,' which was published at Bamberg, whither Hegel had retired after the battle of Jena. This work contains an account of the several grades of development through which the 'self,' or 'ego,' proceeds: first of all, from consciousness into self-consciousness; next, into reflecting and active reason, from which it becomes philosophical reason, self-cognisant and self-analysing, until at last, rising to the notion of God, it manifests itself in a religious form. The title 'Phänomenologie' points out the limits of the work, which is confined to the phenomena of mind as displayed in the element of its immediate existence, *i. e.* in experience. It traces the course of mind up to the point where it recognises the identity of thought and substance, of reason and reality, and where the opposition of science and reality ceases. Henceforward mind develops itself as pure thought or simple science, and the several forms it successively assumes, which differ only in their subject-matter or contents, are the objects of logic, or *dialectic*.

During his retirement at Bamberg, Hegel conducted the political journal of that town with great ability, and with honesty and candour. In 1808 he was called to preside over the gymnasium of Nürnberg. The benefit of the reforms he effected, both in the discipline and the studies of the school, are still gratefully noticed at the annual commemoration. In 1812 he published his 'Logic,' which was designed, with the 'Phenomenology,' to complete the whole body of science. Hegel employs the term logic in a very extended sense. The general merits of this work were admitted, and acknowledged by the offer of a professorship at Heidelberg. His first course of lectures was attended by a numerous and distinguished class, attracted by the originality of his views, notwithstanding the great obscurity of his style. By the publication of the 'Encyclopædia of Philosophical Sciences,' in 1817, his reputation as a philosopher was established, and Hegel was invited by the Prussian government to fill the chair at Berlin, which had remained vacant since the death of Fichte, in 1814. He successively published the 'Philosophy of Jurisprudence;' two new editions of the 'Encyclopædia;' the 1st vol. of the 2nd edition of his 'Logic;' and several articles in the 'Annals of Scientific Criticism,' which he had established as an organ of his system, and of its application to every branch of art and science. He fell a victim, on the 14th November, to the cholera which ravaged Berlin in 1831, and was, in compliance with his express desire, buried by the side of Fichte.

His works are very extensive, and often very obscure. A notion of his philosophical system is given in the 'Penny Cyclopædia,' art. 'Hegel.'

HEGE'SIAS (Ἡγησίας), a Greek rhetorician and historian, was a native of Magnesia, and lived about the time of the historian Timæus, that is, about B.C. 250. Respecting his life no particulars are known, and his works are lost. He wrote a history of Alexander the Great.

HEGE'SIAS, *the Cyrenaic Philosopher*, lived somewhat earlier, in the reign of Ptolemæus Philadelphus. His doctrines in the main points agreed with Aristippus, the founder of the Cyrenaic school, who maintained that pleasure was the great object of man's life; but Hegesias and his school denied that kindness, friendship, and benevolence had any independent existence, but that they arise and disappear with our feeling of the want of them. Happiness is a thing impossible to attain, for our body is subject to many sufferings, and the soul suffers with it. Life and death are equally desirable. Nothing is by nature either agreeable or disagreeable, but becomes so through the circumstances in which a man lives. A wise person therefore looks upon life with indifference, and regards nothing and nobody so much as himself, reducing everything to his own convenience.

HEGI'RA. [ÆRA.]

HEIDELBERG, a city in the Baden circle of Lower Main, is situated in one of the most beautiful parts of Germany on the left bank of the

Neckar, in 49° 24′ N. lat., and 8° 41′ E. long., at a distance of 56 miles, by railway, N. by E. from Carlsruhe, and has 13,430 inhabitants. The town is between the river and the mountains which here form the eastern boundary of the valley of the Rhine. From one of these mountains, called Königstuhl (2000 feet high), on the summit of which a lofty tower has been erected, there is a magnificent view of the most beautiful scenery in Germany. The castle, which was the Elector Palatine's residence, stands on the lower parts of the Königstuhl; it has remained a ruin, but a magnificent one, since 1764, when it was struck by lightning and rendered wholly uninhabitable. In the cellar under it is the celebrated Heidelberg tun, which contains 800 hogsheads, but has not been filled since 1769. The town is chiefly celebrated for its university, which was founded in 1386. The university buildings, no way remarkable, stand in a small square in the centre of the town. In a separate building is the university library, which contains 120,000 volumes, and several manuscripts.

The streets of the town are narrow and gloomy. Among the more remarkable buildings are—the church, dedicated to the Holy Ghost, the interior of which is divided by a partition into two parts respectively used for Protestant and Catholic worship; the church of St. Peter, the oldest in the town; the Museum Club; the Zum-Ritter Inn, which has a richly decorated façade, and is surmounted by the figure of a knight; and the stone bridge over the Neckar, on which is a statue of the Palatine Karl Theodor. The chief trade of the town is in raw tobacco and oil; there are breweries and tobacco factories. Heidelberg was the residence of the electors palatine from the time of Ruprecht I. till 1720, when the electors removed to Mannheim.

HEIGHTS, MEASUREMENT OF. There are three distinct ways by which a height may be measured. The first is by the observed angular elevation of an object, with a measured base [TRIGONOMETRY]; the second is by means of a spirit-level [LEVELLING]; and the third, which we propose here to describe more particularly, is accomplished by means of the barometer. [BAROMETER.]

If we ascend with a barometer through any height, the weight of the column of air which presses on the instrument is diminished, and the counterpoise, namely, the column of mercury under the vacuum, must diminish likewise; that is, the mercury must fall. Now, if the temperature and force of gravity at the higher and lower station were the same in all places and at all times, one formula would always serve, the height of the barometer remaining the same at the same height above the sea. Even as it is, the mean height of the barometer at the two places, when known, could be made to determine their relative heights. But, when only one or two observations can be made at each place, the differences of temperature, &c., must be noted and allowed for.

If the temperature were unaltered during the ascent, and the force of gravity also remained uniform, the *logarithms* of the atmospheric pressures corresponding to different altitudes would *decrease* in arithmetical proportion as the altitudes themselves *increase* in arithmetical proportion; and this would lead to an equation of the form

$$z = c\,(\log.\ h - \log.\ h');$$

where z is the difference of altitudes at two stations, and h and h' the heights of the mercury at the lower and upper stations. This is proved in almost every elementary work on pneumatics.

For very rough estimates of the height z, c is made equal to 10,000 fathoms; and, using the value of z so found, the term $\frac{n}{435}z$ is then *added to* or *subtracted from* that value, in order to obtain one more correct: here n denotes the number of degrees of Fahrenheit's thermometer by which the mean temperature of the air *exceeds* or *falls short* of 31°.

We now proceed to describe a formula for the determination of heights, which is a transformation of the one given in Poisson's 'Traité de Mécanique' (ed. 1833): it supposes that the air intermediate between the higher and lower stations may be treated as if it had throughout the mean between the temperature of the two stations.

Let h and h' be the heights of the barometer at the lower and upper stations; t and t' the temperatures of the air; T and T′ those of the mercury (ascertained by a thermometer whose bulb is in the cistern); r the radius of the earth, supposed to be 6,366,198 metres or 6,962,283 yards; and λ the latitude of the place. All the temperatures are in degrees of Fahrenheit. Let

$$k = h\left(1 + \frac{\mathrm{T} - \mathrm{T}'}{9990}\right)$$

$$c = \frac{20053.95}{1 - .002588\cos.\ 2\lambda}\left(1 + \frac{t + t' - 64.}{900}\right)$$

$$z = c\,(\log.\ h - \log.\ k).$$

Then z itself is a near approximation to the number of yards in the difference of level between the two stations (for metres use 18337.46 instead of 20053.95); but, if a more exact one be required, it may be found by calculating (using z itself as just found)

$$c\left(\log.h - \log.k + 2\log.\left(1 + \frac{z}{r}\right)\right)\left(1 + \frac{z}{r}\right)+$$

When the lower station is at a great distance from the higher on the earth's surface, then five eighths of $\frac{z}{r}$ should be used instead of $\frac{z}{r}$ in the last formula.

The preceding is the most accurate formula which the present state of science will allow to be given, and there is reason to suppose that the constant 20053.95 could not be altered by a single unit with any increase of correctness. The following formula however is sufficient for ordinary purposes :—

$$20115\left(1 + \frac{t + t' - 64}{900}\right)(\log.\ h - \log.\ h');$$

in which the constant 20115 is that determin

by a considerable number of comparisons of theory with trigonometrical observation made by M. Ramond in the Pyrenees. A nearly similar formula has been given by M. Lindenau, with his 'Barometric Tables,' Gotha, 1809.

HEILBRONN. [NECKAR-KREIS.]

HEINECCIUS, JOHANN GOTTLIEB, born at Eisenberg, in Saxony, in 1681, was appointed professor of philosophy at Halle in 1713, and was afterwards professor of law at Franeker in West Friesland, which place he left in 1727, on account of ill health. He was then appointed professor of law at Frankfort-on-the-Oder, and lastly he filled the same chair at Halle, where he died in 1741. Heineccius was a very learned jurist. His works were collected and published at Geneva, 'Opera Omnia,' 9 vols. 4to., 1771, with additions and notes by his son Johann Gottlieb Heineccius.

HEINRICH, CARL FRIEDRICH, was born Feb. 8, 1774, at Moschleben, in the duchy of Saxe-Gotha, where his father was pastor. In 1791 he went to Göttingen, where he became the favourite pupil of Heyne. In 1804 Heyne procured him the professorship of eloquence and of Greek in the university of Kiel. In 1819 he was invited to a professorship in the newly established university of Bonn. He accepted the offer, and henceforth continued to lecture there until his death on the 20th of February, 1838.

Heinrich was a very excellent Latin scholar, though his lectures on Latin authors were very unequal. The best were those on the Satires of Horace, Juvenal, and Persius; for he himself had great satirical talent. Among his labours is an excellent edition of Juvenal, which appeared after his death, at Bonn, 1839, 2 vols. 8vo. (Long, in the 'Classical Museum,' vol. i. p. 369, &c.) An edition of Persius, for which Heinrich had likewise left the MS. ready, was published by Otto Jahn.

HEINSE, JOHANN JAKOB WILHELM, was born at Langewiesen, near Ilmenau in Thuringia, Feb. 16, 1746. After passing through a course of legal studies at the university of Jena, he took up his residence at Erfurt, where he commenced his career as an author by a translation of Petronius (1773), which was quickly followed by 'Laidion, or the Eleusinian Mysteries.' His next productions were less objectionable for their tendency, being a prose translation of Tasso's 'Jerusalem,' and another of Ariosto's 'Orlando,' both which he is said to have executed during his residence in Italy (1780-3). But these tasks did not prevent him from giving full scope to his unrestrained passion for enjoyment; and with what licence he abandoned himself to the gratifications which Italy, long the object of his wishes, presented to him, may easily be inferred from his 'Ardinghello,' which may be considered in some degree as the record of his own feelings and opinions. His 'Dialogues on Music' were not published till after his death, which happened at Mainz, June 22, 1803.

HEINSIUS, DANIEL, was born at Ghent, in the year 1580, and was sent, at the age of fourteen, to study law at Franeker. But Heinsius resolved to study ancient literature; and accordingly he went to Leyden, where he prosecuted the study of the classics under Joseph Scaliger. In 1607 he was made librarian and secretary to the university. He died Feb. 25, 1655, at the age of seventy-five, with the character of being one of the most learned men of his time. He held the office of historian to the States of Holland, from which he received a handsome salary. He also took an active part in the theological warfare of the times, and was appointed secretary to the synod of Dort in 1618.

The name of Heinsius is principally known by his editions of the Greek and Roman classics. His Latin poems were highly esteemed by his contemporaries: they were published at Leyden in 1602.

HEINSIUS, NIKOLAUS, only son of Daniel Heinsius, was born at Leyden, 29th July, 1620. In 1649 he was invited by Christina, queen of Sweden, to settle at Stockholm, where he remained till the death of his father in 1655. He resided principally in Holland during the remainder of his life. He was sent on a public mission to Russia in 1667. He died on the 7th October, 1681. Heinsius edited Claudian, 1650, 1665; Ovid, 1652, 1661; Virgil, 1676; Valerius Flaccus, 1680. His Latin poems were published at Amsterdam in 1666.

HEIR, by the law of England, is he who succeeds by right of blood to the real property or lands, tenements, and hereditaments of the deceased owner, designated by the correlative term of ancestor, not given away from him by will. The English law which determines the succession to personal property, when uncontrolled by local custom, is contained in the Statutes of Distributions (22 and 23 Chas. II. c. 10; 29 Chas. II. c. 3; and 1 Jac. II. c. 17), which are founded upon the provisions of the civil law. The persons so entitled are not called heirs, but next of kin.

The several rules of descent which regulate the right to succeed to real property spring from the system of feudal tenures, but have been somewhat modified by the recent statute of 3 and 4 Wm. IV., c. 106. [DESCENT; FEUDAL SYSTEM.]

HEIR-LOOMS are such goods and personal chattels as, contrary to the nature of chattels, go to the heir by special custom along with the inheritance, and not to the executor of the last proprietor. [CHATTELS.] They are principally things which cannot be removed without damage to the inheritance, such as chimney-pieces, fixed tables, &c.

HEJAZ. [ARABIA.]

HE'LENA, daughter of Constantine the Great and of Fausta, was given in marriage by her brother Constantius to her cousin Julian, when he made him Cæsar, at Milan, A.D. 355. She followed her husband to his government of Gaul, and died in 359 at Vienne.

HELENA, ST., the first wife of Constantius Chlorus, was born of obscure parents in Bithynia. Her husband, on being made Cæsar by Diocletian and Maximianus (A.D. 292), repudiated Helena, and married Theodóra, daughter of Maximianus.

When her son Constantine became emperor, he called his mother to his court, and gave her the title of Augusta. He also gave her large sums of money, which she employed in building and endowing churches, and in relieving the poor. About A.D. 325 she set out on a pilgrimage to Palestine, and she thought that she had discovered at Jerusalem the sepulchre of Jesus Christ, and also the cross on which he died. She built a church on the spot supposed to be that of the Sepulchre, which has continued to be venerated by that name to the present day. She also built a church at Bethlehem in honour of the nativity of our Saviour. She rejoined her son at Nicomedía, in Bithynia, where she died A.D. 327 at a very advanced age. She is numbered by the Roman Church among the saints. (Eusebius, *Life of Constantine.*)

HELENA, ST., an island in the Atlantic Ocean, 1200 miles west of the coast of Benguela, in South Africa. Seen at a distance, it appears like a lofty mass of barren rocks rising in a pyramidal form; on a nearer approach, rugged and almost perpendicular cliffs, from 600 to 1200 feet high, are seen encompassing the island all round, broken through in several places by deep chasms which open to the sea-shore. One of the principal of these openings is called James's Valley, on the north-west coast of the island, and at the opening of it to the sea is James's Town, the only town and port of the island, which is defended by strong batteries, and is the residence of the authorities. James's Town is in 15° 55′ S. lat., and 5° 49′ W. long. Ascending James's Valley, we arrive at the plain or table-land of Longwood, situated in the eastern part of the island, and consisting of 1500 acres of fine land, nearly 2000 feet above the sea, sloping gently towards the south-east. Longwood House was the place of Napoleon's confinement and death. In the centre of the island rises Diana's Peak, 2693 feet high. The circumference of the island is about 28 miles. The population, exclusive of the garrison, is about 5000, about one-third of whom are Europeans, and the rest blacks, men of colour, and Chinese. The climate of St. Helena is one of the healthiest under the tropics, and is found beneficial to invalids from India, and even from Europe. Viewed from the sea, the island appears barren; but the interior is covered with a rich verdure, and is watered by abundant springs. Horned cattle, sheep, and goats feed on the rich pastures. The base of the island appears to be basalt, and lava and scoriæ are found scattered about the surface.

The island was discovered by the Portuguese in 1502. It was afterwards taken possession of by the Dutch, who abandoned it in 1651 for the Cape of Good Hope. The English East India Company then took possession of it, and it became a resting-place for their ships between India and Europe. It is still visited by ships returning from India, who there take in fresh provisions and water.

HELGOLAND, or HELIGOLAND, an island in the German Ocean, about 25 miles from the mouth of the Elbe, consists of a high cliff and a low land united by a rocky isthmus 500 paces in length. The highest part of the cliff rises almost perpendicularly, 170 feet above the sea. The ascent to it is by a flight of 180 steps. The summit is a tolerably level plain about 4200 paces in circumference. The low land, which is uninhabited, has two good harbours. The circumference of the whole island does not exceed 3 miles. In former ages it was of much greater extent; but the action of the sea is constantly diminishing it. The inhabitants, about 2500 in number, live on the cliff. They are descended from the Frieslanders, and subsist chiefly by fishing, and by acting as pilots. The English took the island from the Danes in 1807, and it was formally ceded to them in 1814. They have erected four batteries and a lighthouse on the cliff, and have a garrison and a governor, but levy no taxes, and do not interfere with the internal government. The lighthouse is in 54° 11′ 84″ N. lat., and 7° 53′ 13″ E. long.

HELIACAL (ἥλιος, the sun), a term applied to the rising of a star, when it takes place just before that of the sun. If we suppose a star not very far from the sun's orbit, then, as the sun approaches that star, it will become for a season permanently invisible, for it will rise after the sun, and set after it also, the heavens remaining too light in the quarter of sunset to permit the star to be seen. But, as soon as the orbital motion of the sun has carried it past the star, the latter will begin to rise first, and in process of time will rise so much before the sun as to become visible just before daylight. In this case it is said to rise heliacally: thus a star sets heliacally before its season of disappearance, and rises heliacally after its reappearance. The successive heliacal risings of stars thus form a continued warning of the seasons, and were used for this purpose among some ancient nations. But, since the precession of the equinoxes slowly changes the offices of different stars with respect to the seasons, an ancient record of the time of the year when a given star rose heliacally would enable us to make a rough guess at the number of centuries elapsed since the time of the observation. Upon such a basis Newton rested a great part of his system of chronology, taking the descriptions of the heliacal risings of stars from Hesiod.

HELIA'NTHEMUM, a genus of plants belonging to the natural order *Cistineæ* or *Cistaceæ*. There are about 150 species enumerated, which are distributed in various parts of the world: they are chiefly found in the south of Europe, the north of Africa, and a few species in America. *H. guttatum* is an erect herbaceous plant. The flowers are yellow, with a deep red spot at the base of each petal. It is a native of France, Italy, Spain, Portugal, and Turkey. *H. canum*, the Hoary Sun-Rose, has small yellow flowers. It is a native of the south of France and Germany, and is rarely found in Great Britain. *H. vulgare*, the common Rock-Rose, is a native of Europe, and is found in Britain in dry hilly pastures.

There is a very beautiful variety with double pale yellow flowers, which is much cultivated by florists. The stamens, if touched in the sunshine, spread slowly, and lie down upon the petals.

Almost all the species of Helianthemum are elegant plants, hardy, and easily cultivated.

HELI'CIDÆ, or *Helix Family*, the general name by which the land Shell-Snails are distinguished. This group constitutes part of the 'Pulmonés Terrestres' of Cuvier, the first division of his order *Gasteropoda*. Cuvier divides his Pulmonés, or air-breathing slugs and snails, into the following sections:—

1. *Les Pulmonés Terrestres*—containing the Slugs (*Limacés*), divided into several genera; the Escargots (*Helix*), of which the common Garden-Snail is an example, divided into several genera; the Nompareilles (*Clausilia*); and Agatines (*Achatina*).

2. *Les Pulmonés Aquatiques*—including Les Onchidies (*Onchidium*), shell-less; Les Planorbes (*Planorbis*); Les Limnées (*Limnæus*); Les Physes (*Physa*); Les Auricules (*Auricula*); and Les Melampes (*Conovulus*).

It is not necessary, in this work, to enter into an analysis of the systems of Lamarck, De Blainville, Rang, and Férussac, nor into the minutiæ of genera or species. It will be sufficient to give the following arrangement, by Mr. Gray, in the 'Annals of Philosophy,' August 1824.

Terrestrial.

Tentacles retractile. Eyes pedicillate.
Gasteropodous . . *Limacidæ.*
Trachelipodous . . *Helicidæ.*

Aquatic.

Tentacles contractile. Eyes sessile.
Trachelipodous (Mantle thick-edged) *Auriculidæ.*
——————— (Mantle thin-edged) *Limnæadæ.*
Gasteropodous (Mantle shield-like) *Onchidiadæ.*

Cuvier observes that 'the Pulmonifera are distinguished from other mollusks; that they respire the elastic air by means of an orifice under the edge of the mantle, which they dilate or contract at pleasure; they have therefore no branchiæ, but only a network of pulmonary vessels which spreads itself upon the walls, and principally upon the ceiling of the respiratory cavity; some are terrestrial, others live in the water, but are obliged to come from time to time to the surface, and open the orifice of their respiratory cavity in order to respire. All these animals are hermaphrodites. Almost all the terrestrial pulmonifera have four tentacles; two or three only, of small size, do not exhibit the inferior pair.'

Under the *Helicidæ* are comprehended the genera *Helix*, *Carocolla*, *Vitrina*, *Anostoma*, *Helicina*, *Bulinus*, *Pupa*, *Clausilia*, *Achatina*, *Auricula*, *Cyclostoma*, *Pedipes*, *Chondrus*, *Succinea*, &c. In *Auricula* and *Cyclostoma* the tentacles are only two.

Having thus endeavoured to explain the position of the *Helicidæ*, of which the large Garden-Snail (*Helix aspersa*) is an example, we may proceed to give a brief and general outline of the more important parts of their organic economy as seen in the restricted genus *Helix*.

Nutrient Organs.—The mouth is transverse, and a portion of it is destined to perform the office of teeth. The margin of the upper lip is dentated, and of a horny texture, of a dark colour and arched form; the lower lip is divided by a vertical fissure. The salivary glands are of a conglomerate structure, and lie on the parietes of the stomach.

Respiratory System.—The pulmonary sac receives the air by an anterior orifice on the right side of the neck; and the reticulation of the pulmonary artery, or continuation of the veins of the body, ramifies on its roof.

Brain, Nervous System, and Senses.—A ganglion well developed, situated above the œsophagus, of a transverse shape, supplies the antennæ and the eyes with nerves; this ganglion forms a ring, completed by a larger ganglion below the œsophagus, from which numerous nerves radiate to supply the body. A small ganglion is formed on the nerve which supplies the heart and respiratory apparatus. The sense of touch resides especially in the ventral disc or foot, and in the lower tentacles.

The eyes are situated on the side of the posterior tentacles or horns, at their extremity. In this position, though destitute of appropriate muscles, the eyes have the advantage of all the mobility with which the tentacle itself is endowed; and by the admirable construction of the same part, they are defended from external injury by being retracted and inverted, together with the extremity on which they are supported, within the cavity of the tentacle, as in a sheath.

The taste appears to be sufficiently acute, nor is the sense of smell absent, though we know not by what particular organ it is exercised. Slugs and snails are attracted towards their favourite food, as is well known to the gardener.

No organs of hearing have been detected, nor do they appear to enjoy this sense.

Reproduction.—Shell-Snails are hermaphrodites, but fecundate each other by mutual union. The situation of the reproductive organs is at the anterior orifice of the neck. Most are oviparous, but some are viviparous. The shells, as a general rule, are either round and enveloped in a skin, as in the common garden snail, or oval and inclosed in a hard calcareous shell, as in *Achatina* and *Bulinus* (or *Bulimus*). [BULINUS.]

Power of Repairing Injuries.—The power which snails, in common with other testaceous mollusks, possess of repairing their shells, is known to most observers, and requires no comment; but the extent to which these animals will repair lesions of the soft parts, and even reproduce some of the principal ones after they have been deprived of them, is deserving of notice. The works of Schoeffer, Spallanzani, Bonnet, and others, bear testimony to the wonderful *vis vitæ* in these animals, and its energy in replacing parts, the deprivation of some of which must, it might have been previously thought, have been followed by immediate death. Spallanzani cut off one of a snail's horns: it began to bud again in about 25 days, and continued to grow till it was equal in length to the other. He removed part of the head: in course of time the part was renewed. Not that this was always the case in those instances where the entire head had been taken off; but even in these instances the snail often recovered, and at the end of a few months appeared with a new head in all respects equal to the old one. Spallan-

zani's experiments have been confirmed by Gerardi and others.

Hybernation.—In our temperate climate, as soon as the chills of autumn are felt, the shell-snails begin to withdraw to winter quarters and prepare for their annual repose. They either burrow into the earth, attach themselves to sheltered crevices in walls, congregate under accumulations of garden-pots in the gardener's tool-house, or in corners of the garden, under the roots of hedgerow-trees, under the moss of banks, and in various other places of refuge. By means of the secreted mucus they adhere to whatever object they fix upon for attachment, and, besides this, throw a temporary operculum like a drum-head over the mouth of their shell. This operculum consists of several layers, with air between each; and this air, on the reviviscence of the snail in spring, as layer after layer is broken down, serves the necessities of the pulmonic system, till the last layer (or that first formed) is demolished. For an admirable account of the physiology and details connected with the hybernation of shell-snails, see the abstract of Mr. Gaspard's Memoir, with Notes by T. Bell, F.L.S., 'Zoological Journal,' vol. i. It is well worth the perusal of the student in zoology and physiology.

Geographical Distribution and Habits.—The *Helicidæ* are most widely diffused over the surface of the earth; scarcely any countries but those where the climate is surpassingly rigorous are without some species of the family. Many of the shells are strikingly beautiful in form and colour, and these are mostly the inhabitants of intertropical countries. Some of the genera (*Achatina*, for instance) attain a very large size, and lay eggs in proportion. *Helix aspersa*, the common garden-snail, is distributed over a large portion of the globe. It is found, for instance, at the foot of Chimboraço, in the forests of Guyana and Brazil, and on all the coasts of the Mediterranean in Europe, Asia, and Africa. *Helix pomatia* has been naturalised with us. The first importation is attributed by some to Sir Kenelm Digby. Merrett mentions it as a British inhabitant before his time. A moist and rather warm state of the atmosphere seems most congenial to this family. To avoid much dry heat, they get under stones, under old trunks of trees, leaves, &c. &c., and some of the species will burrow into the earth for protection against it. A shower will bring them forth in such numbers sometimes, the smaller species especially, as to induce the belief in some cases that it has been raining snails. Most of the species hybernate.

Utility to Man.—The *Helicidæ*, from their voracity, are very injurious to the agriculturist and horticulturist; but there can be no doubt that the larger species are good food. We know that they were a favourite dish with the Romans, who had their *cochlearia*, where they were regularly fattened with new wine boiled down and meal (*sapa et farre*, &c.) (Pliny, 'Hist.,' lib. ix. c. 56.) *Helix pomatia* is used as food in many parts of Europe during Lent, and the snails are kept in an *escargotoire* (snaillery), which is generally a large place boarded in, having the floor covered half a foot deep with herbs, where the animals fatten. Many are familiar with the passage referred to in Pliny, who, on the authority of Varro, relates the incredible size to which the art of fattening had brought the snails.

Fossil Helicidæ.—Fossil species of *Helicidæ* are by no means rare. Thus M. Deshayes enumerates thirty-five species of *Helix*, two of *Anostoma*, one of *Helicina*, three of *Pupa*, two of *Clausilia*, three of *Bulimus*, three of *Achatina*, seven of *Pedipes*, and six of *Cyclostoma*, &c., as fossil (tertiary), mostly in the Pliocene period of Lyell, and many of them as both living and fossil.

HELICTIS, Mr. Gray's name for a genus of quadrupeds which inhabit eastern Asia, and has the general appearance and colouring of *Mydaüs*, combined with a dentition resembling that of *Gulo* or *Mustela*, but differing from both the latter genera in the large internal central lobe of the upper carnivorous tooth. The genus is thus characterised by Mr. Gray:—

$$\text{Incisors, } \frac{6}{6}\text{; Canines, } \frac{1—1}{1—1}\text{; Molars, } \frac{5—6}{5—6}.$$

Head elongated. Feet short; soles of the feet nearly naked to the heel; toes 5—5; claws strong, the anterior ones long and compressed. Tail cylindrical and moderate.

Mr. Gray exhibited to the Zoological Society one species, *Helictis moschata*, the entire length of which was 23½ inches, of which the tail measured 8. Inhabits China, and smells strongly of musk. For further particulars see 'Zool. Proc.,' 1831.

HELIER, ST. [JERSEY.]

HELIOCENTRIC (having the sun as centre), a term applied to the place of a planet, as seen from the centre of the sun, in opposition to its *geocentric* place, as seen from the centre of the earth.

HELIODO'RUS was born at Emesa in Syria, in the fourth century of the Christian æra. He was bishop of Tricca in Thessaly. He wrote in his youth a romance in the Greek language entitled 'Æthiopica,' which contains an account of the wonderful adventures of two lovers, Chariclea, the daughter of Hydaspes, king of Ethiopia, and Theágenes, a noble Thessalian. The work of Heliodorus served as a kind of model to the subsequent Greek writers of romance. The best edition is by Coray, 2 vols. 8vo., Paris, 1804. The 'Æthiopica' has been translated into most modern European languages. There is an English translation by Underdown, 1587, 4to.; and by others.

HELIOGABA'LUS. [ELAGABALUS.]

HELIO'METER (ἥλιος, the 'sun,' and μέτρον, 'measure') is the name given by M. Bouguer to a micrometer invented by himself about 1745, by means of which the diameter of the sun, or any other heavenly body may be measured with considerable accuracy. The name is also given to the equatorially mounted micrometer executed at Munich in 1829 for the Königsberg Observatory. [MICROMETER.]

HELIO'POLIS. [BAALBEC.]

HELIO'PORA, a genus of stony Polyparia, es-

tablished by De Blainville, from observations of MM. Quoy and Gaimard on a recent species called by Lamarck *Pocillopora caerulea*.

Generic Character.—Animals short and cylindrical, provided with a simple circle of thick tentacula, fifteen or sixteen in number, contained in vertical or diverging cylindrical cells; cells immersed, internally crenulated by imperfect radiating lamellæ, united into a calcareous mass, which is regularly porous in the intervals of the cells. The Coral is found attached to various bodies. Three recent species are mentioned by De Blainville, all from warm seas. One of the fossil species (*Heliopora porosa*, De Blainville; *H. interstincta*, Bronn) abounds in strata of the Silurian system; others occur in the chalk and in tertiary deposits.

HELIOSCOPE (a Greek term signifying literally 'sun-observer') is a kind of telescope adapted for making observations upon the sun without the eye being injured by the intense brightness of the solar rays. A coloured glass placed before the lens nearest to the eye, in a telescope, has long been the means used to prevent such injury.

HELIOSTAT (ἥλιος, the 'sun,' and the root στα, *sta*, to 'put or place') is the name given to an instrument employed in making optical experiments on the physical properties of light. The instrument consists of a plane metallic mirror, from the back of which projects a rod perpendicularly to its plane. The extremity of the rod is connected with the index of a clock, the plane of whose face is parallel to the equator; and, as the index is turned by the wheel-work, the motion of the rod causes the mirror to turn about a vertical axis, and also about a horizontal axis, so that a pencil of the sun's light reflected from the mirror is always in the same position. (Biot's *Physique Expérimentale*, tom. ii. cap. 4.)

HELIOTROPIUM, a genus of plants belonging to the natural order *Ehretiaceæ*. *H. Peruvianum*, Peruvian Heliotrope or Turnsole, is a shrub, growing one or two feet high, and is much cultivated on account of the scent of its flowers, which resembles very much that of the vanilla. It is a native of Peru. *H. Europæum*, the European Turnsole or Heliotrope, is a native of the south of Europe and the regions of the Caucasus. The flowers are sweet-scented. *H. villosum* is a native of Greece and of the islands of the Archipelago. It has large white corollas with a yellow throat.

Upwards of eighty species of this genus have been enumerated. Some of them are consumed in large quantities by perfumers for the sake of their volatile oil. They are astringent and also mucilaginous, and poultices made of the leaves have been applied to cancerous and scrofulous sores.

HELL, MAXIMILIAN, a distinguished astronomer and member of the order of Jesuits, was born May 15, 1720, at Schemnitz in Hungary, and manifested, at an early age, a decided taste for the study of natural philosophy and astronomy. At twenty five years of age he was employed as an assistant in an observatory belonging to the Jesuits at Vienna, and he was at the same time keeper of the museum of experimental philosophy which had just then been formed in that city. After residing some years in Hungary and Transylvania, he returned, in 1758, to Vienna, where he was established in an observatory which had been built in conformity to his own directions; and he held the appointment during the remainder of his life.

Through the mediation of Count Bachoff, who was sent from Copenhagen for the purpose of making the proposal, he accepted an invitation from the court of Denmark to undertake a journey to Wardhuys in Lapland, in order to observe there the transit of Venus over the sun's disc. Accordingly he set out from Vienna in 1768; and, after staying a short time at Copenhagen, he proceeded to the place of his destination: he was absent about two years and a half on that mission, when, having fully succeeded in its object, he returned to Vienna. Besides observing the transit, Hell took advantage of his residence in Lapland to study the geography, the natural history, and the climate of the country; the history, language, and religion of the people, with the state of the arts among them: he made also numerous observations on terrestrial magnetism, on the phenomena of the tides and winds, and on the variations of the barometrical column; and he measured the heights of the principal mountains.

The principal work published by this astronomer was a series of Ephemerides in thirty-five volumes 8vo., the collection being entitled 'Ephemerides anni 1757—1791 ad Meridianum Vindobonensem Calculis definitæ.' He published an edition of the Solar Tables of La Caille, and the Lunar Tables of Mayer, with supplements: he also published his celestial observations in Lapland, under the title 'De Transitu Veneris ante Discum Solis die 3 Jun., 1769, Wardoehusii observato,' 1770; and a work entitled 'De Parallaxi Solis ex Observationibus Transitûs Veneris, anni 1769,' 1773.

Hell died at Vienna, April 14, 1792.

HELLA'NICUS, one of the early Greek prose writers, was born at Mityléne in the island of Lesbos, B.C. 496. He wrote several historical works, which are frequently quoted by ancient writers. Hellanicus is mentioned by Thucydides (i. 97). The fragments of Hellanicus were published by Sturz, 8vo., Leip. 1787; 2nd edition, 1826.

HELLEBORE, WHITE. [VERATRUM ALBUM.]

HELLE'BORUS, a genus of exogenous plants belonging to the natural order *Ranunculaceæ*. The most remarkable species is that which produced the Black Hellebore, a dangerous acrid poison, much used by the ancient Greek physicians in mania, epilepsy, and dropsy.

Helleborus orientalis has been substituted in the Pharmacopœia for the *Helleborus niger*, from a belief that it is more powerful. It is a perennial species, growing in mountainous places in the East. The root, which is the part employed, is black: it is extremely acrid. It is to be regretted that many other roots, especially those of *Actæa spicata* and *Adonis vernalis* are often intentionally

or accidentally sold instead of the root of *Helleborus niger*. These may be discriminated by physical characters (particularly the internal structure) and by chemical tests.

Like most ranunculaceous plants, hellebore occasions rubefaction and inflammation of any surface with which it is brought in contact. When taken into the stomach in a moderate dose, it gently stimulates it and the other viscera of the abdomen; but in large doses it is a fatal poison.

HELLENES. [GREECE.]

HELLESPONT. [DARDANELLES.]

HELMET, an ancient armour of defence for the head, still worn by the officers and soldiers of some of our cavalry regiments. As a part of defensive armour, the helmet is of high antiquity: some sort of covering of this description for the head appears to have been worn by the warriors of every country. Helmets were found even among the inhabitants of the South Sea Islands when discovered by Captain Cook.

It does not appear that the Greek or Roman helmet usually protected the face. For the helmets in more modern use, Grose's 'Treatise,' and Meyrick's 'Critical Account of Ancient Armour,' must be referred to. Among the varieties which had separate names we find the Chapelle de Fer, the Bacinet, the Burgonet, the Castle, the Hufken, the Morion, the Salade, and the Skull. These were almost invariably of steel. There was also the Justing Helmet, used in tournaments, which was sometimes of leather.

As ornaments over the shield or coat of arms, helmets are still used in heraldry. The full-faced helmet with six bars, all of gold, damasked, is for the sovereign and princes of the blood; the full-faced helmet of steel, for marquises and dukes; earls, viscounts and barons have a profile or side-standing helmet of steel ornamented with bars; the full-faced helmet of steel, with the vizor or bevor open, is for baronets and knights; the profile helmet, steel, with the visor closed, for an esquire.

HELMONT, VAN. [CHEMISTRY.]

HELMSTEDT. [BRUNSWICK.]

HELOISE. [ABELARD.]

HELO'PIDÆ (Leach), a family of coleopterous insects of the section *Heteromera* and sub-section *Stenelytra*. Head short, obtusely terminated anteriorly; mandibles notched at the apex; antennæ placed near the eyes, generally filiform, or nearly so, or slightly thickened at the apex, where the joints are short; the basal joint of the antennæ hidden above by a projected margin of the head; the third joint long; terminal joint of the maxillary palpi large and securiform; eyes emarginated anteriorly; legs moderate; the penultimate joint of the tarsi generally simple or but slightly emarginated; claws simple; body usually convex, and of an oval form.

The larvæ of these insects live in rotten wood, upon which they feed; they are of a cylindrical form, hard to the touch, and have six small legs, attached, two to each of the thoracic segments. The perfect insects are, like the larvæ, also found in rotten wood, or under the bark of trees; they are rather slow in their movements, and generally adorned with metallic colours.

Upwards of sixty species of the genus *Helops* are enumerated in catalogues, and these are chiefly confined to Europe and North America.

HELOSCIA'DIUM, a genus of plants belonging to the natural order *Umbelliferæ*, and to the tribe *Ammineæ*. There are three British species of this genus, *H. nodiflorum*, *H. repens*, and *H. inundatum*. The first is a native of brooks and ditches, and is frequently mistaken for the water-cress. The second is a rare plant in Great Britain. The last species is found in ponds.

HELOTS. [SPARTA.]

HELSINGFORS. [FINLAND.]

HELSTON. [CORNWALL.]

HELVELLYN. [CUMBERLAND.]

HELVETIC ALPS. [ALPS.]

HELVE'TIUS, CLAUDE-ADRIEN, was born at Paris in January 1715, and was educated at the Jesuits' College of Louis-le-Grand. Having passed through a course of legal study, Helvetius obtained the lucrative appointment of *fermier-général*, through the influence of the queen, Marie Leczinsky, to whom his father was physician. But, disgusted with the oppressive nature of its duties, he resigned this situation, and purchased that of chamberlain to the queen's household. At this period Helvetius led a disorderly life; and vanity was a conspicuous feature in his character. But Helvetius was as kind-hearted as he was vain, and an act of beneficence was as dear to him for its own sake as the applause which he courted so eagerly.

In 1751 Helvetius married the beautiful and accomplished daughter of the Comte de Ligneville. From this time he lived chiefly in retirement at Voré, enjoying with his wife and children the pleasures of domestic life, and ameliorating the condition of his tenants and vassals. In 1758 he published the treatise 'De l'Esprit,' which was denounced by the court and the Jesuits as dangerous to society and to religion. To regain the favour of the court, Helvetius published three letters of apology. Notwithstanding his confession of a Christian faith, and his disclaimer of all opinions inconsistent with its spirit, the doctors of the Sorbonne drew up a formal condemnation of the work; and it was publicly burned, according to a decree of the parliament of Paris. The style of the work is vicious and declamatory, but the argument is well sustained, and enforced by great felicity and copiousness of illustration. In 1764 Helvetius visited England. He died at Paris, 26th December, 1771, leaving behind him a work entitled 'De l'Homme, de ses Facultés et de son Education,' which was published the same year at London by Prince Gallitzin. This treatise, which may be considered as a continuation of and commentary upon his earlier philosophical work, is vastly superior to it in style.

HELVIN, a crystallised mineral, of which the primary form is a cube, and the colour a greenish yellow. It consists chiefly of silica, protoxide of manganese, and sulphuret of manganese.

HELVOETSLUYS. [HOLLAND.]

HEMANS, FELICIA DOROTHEA, was born September 25, 1794, at Liverpool, where her father, whose name was Browne, was engaged

in mercantile pursuits. He was a native of Ireland; her mother was an Englishwoman, but was descended from a Venetian family, through her father, who was commercial agent at Liverpool for the Venetian government. About the year 1800 Mr. Browne, in consequence of the failure of a mercantile concern, removed his family from Liverpool to an old mansion, spacious and solitary, called Grwych, not far from Abergele, in Denbighshire, North Wales. Mr. Browne died not long afterwards. Felicia Browne began to write poetry before she was nine years of age. Her first volume of poems was published in 1808, and contains some verses written by her as early as 1803 or 1804. A harsh review of this little volume affected her so much that she was confined to her bed for several days. Her second volume, 'The Domestic Affections,' was published in 1812.

In 1812 Miss Browne became the wife of Captain Hemans, of the fourth regiment. His constitution had suffered so severely in the retreat upon Corunna, and subsequently by fever caught in the disastrous Walcheren expedition, that he felt it necessary, a few years after their marriage, to exchange his native climate for that of Italy. This at least is the motive assigned for his leaving his wife; but their union, it is said, was not happy, and this separation, which took place just before the birth of her fifth son, closed it for ever. Mrs. Hemans, with her five sons, went to reside with her mother, then living at Bronwylfa, near St. Asaph, in North Wales.

Mrs. Hemans now resumed her literary and poetical pursuits with increased ardour. She studied the Latin, Italian, Spanish, Portuguese, and German languages. She made some translations from Horace, Herrera, and Camoens, and contributed a series of papers on Foreign Literature to the 'Edinburgh Magazine.' 'The Restoration of the Works of Art to Italy' was published in 1815; 'Tales and Historic Scenes,' in 1819; and, about the same time, 'The Sceptic,' a didactic poem, in heroic rhyme; and 'Modern Greece,' in ten-line stanzas. Her poem of 'Dartmoor' obtained the prize from the Royal Society of Literature in 1821. Her tragedy 'The Vespers of Palermo,' was represented at Covent Garden Theatre, London, in 1823. It was unsuccessful there, but was afterwards better received at Edinburgh, when Walter Scott wrote an epilogue for it. 'The Siege of Valencia,' 'The Last Constantine,' and other Poems, were published in 1823.

In 1825 Mrs. Hemans removed, with her mother, her sister, and her own sons, to Rhyllon, near St. Asaph. Her sister had returned, in 1821, from Germany, where one of her brothers was attached to the Vienna embassy, bringing with her a fresh supply of German books, and Mrs. Hemans's delight in German literature may be dated from that time. Her 'Lays of many Lands,' most of which appeared in the 'New Monthly Magazine,' then edited by Thomas Campbell, were suggested by Herder's 'Stimmen der Völker in Liedern,' and, preceded by 'The Forest Sanctuary,' formed her next volume, published in 1827, which was followed, in 1828, by the 'Records of Woman.'

In the autumn of 1828, Mrs. Hemans established herself at the village of Wavertree, near Liverpool, and in 1830 she published 'The Songs of the Affections.'

In the spring of 1831 Mrs. Hemans left England for Dublin, where she took lodgings. Her health, from the time of her leaving England, became rapidly worse.

The latter months of 1833 were busily spent in arranging and preparing for publication the three collections of her poems which were published in the spring and summer of 1844; 'Hymns for Childhood;' 'National Lyrics and Songs for Music;' and 'Scenes and Hymns of Life.'

In August 1834, Mrs. Hemans took the scarlet fever, and, when imperfectly recovered, caught a cold; ague was superinduced, and never left her till it was subdued by her last fatal malady, dropsy. On the 26th of April, 1835, Mrs. Hemans dictated her last poetical effort, the 'Sabbath Sonnet.' She continued to sink gradually till May 12, 1835, when she died. She was buried in St. Anne's Church, Dawson Street, Dublin. A volume of 'Poetical Remains' was published after her death.

HEMATIN, the colouring matter of the *Hæmatóxylon campechianum*, or logwood. It appears in small crystalline laminæ of a reddish colour. It is decomposed by heat, and is soluble in water, where its colour changes to orange and yellow.

HEMATOSIN, the red colouring matter of the blood. It has not however been obtained in a perfectly pure state, owing to the difficulty of separating it from other substances, and to the facility with which it undergoes change. A peculiarity of hematosin is its containing oxide of iron, which does not occur in other parts of the animal system. The hematosin of bullocks' blood, but not quite pure, for the reasons already stated, analysed by Mulder, yielded the following ingredients:—

Carbon . . .	66.49
Azote . . .	10.54
Hydrogen . . .	5.30
Oxygen . . .	11.01
Iron . . .	6.66
	100.

HEMEL HEMPSTEAD. [HERTFORDSHIRE.]

HEMERALO'PIA, a word which is now used to signify 'night-blindness,' though in fact it means 'day-seeing,' being similarly formed to the genuine Greek word 'nyctalopia' (*νυκταλωπία*), which means 'night-seeing.'

Night-blindness is a common disease amongst seamen in the East and West Indies, the Mediterranean, and in all hot countries, and affects in a slighter degree soldiers and the natives in the same parts of the globe. To persons affected by it all objects appear at sunset as if covered with an ash-coloured veil, which becomes gradually denser, and at last involves them in complete darkness. In slight cases they can see by bright candle-light or by moon-light; but, after the disease has lasted a few days, even the largest objects are invisible after sunset, and the patients have to grope their way even where the moon or candles

are shining brightly. The pupils are generally dilated, and at night cannot be made to contract even by a brilliant light.

The disease will generally get well, though it may exist for weeks or months. The most successful treatment is the repeated application of small blisters to the temples.

Nyctalopia, night-vision, or day-blindness, probably never occurs as a separate disease. It is often a symptom of scrofulous ophthalmia and other diseases, where the eye is so irritable that the stimulus of day-light cannot be borne, as well as of those conditions in which great dilatation of the pupil is requisite for vision, as in commencing cataract, or opacity of the centre of the lens or its capsule.

HEMERO'BIUS, a genus of insects of the order *Neuroptera* and section *Planipennes*. The genus, as established by Linnæus, has been dismembered by subsequent entomologists, and is now equivalent to a family distinguished by the filiform antennæ and by the number (four) of the palpi of the insects included in it. They have soft slender bodies, much exceeded in length by the large reticulated wings, which, when the animal is at rest, are deflexed. Their eyes are globular and vividly metallic. The larvæ are ferocious in habit, and prey upon plant lice, seizing them with their powerful jaws, and sucking them to death. When full grown, they spin, and envelop themselves in a silken cocoon. The eggs of *Hemerobii* are deposited on plants, and are pedunculated, so as to resemble fungi, for which they have sometimes been mistaken. These insects range from Europe to Australia, and there are many species natives of the British Isles.

HEMICI'DARIS, a genus of fossil *Echinodermata*, from the oolite.

HEMINGFORD, WALTER, sometimes called HEMINGBURGH, a canon regular of the Austin Priory of Giseburn, or Gisborough, in Yorkshire, where he died in 1347. His 'History,' which begins from the Norman Conquest, continues to the reign of King Edward II. It was first published by Gale in his 'Scriptores V.,' fol., Oxford, 1687; and again by Hearne, in 2 vols. 8vo., Oxford, 1731.

HEMIO'PIA (from ἡμί, 'half,' and ὤψ, 'the eye') is a disease in which the patient sees only a part of the object he looks at; the middle of it, or its circumference, or its upper or lower part, or more commonly one lateral half, being completely obscured.

HEMIPNEU'STES, a genus of fossil *Echinodermata*, from the chalk marl.

HEMISPHERE, the half of a sphere. [SPHERE.]

HEMI'PTERA (from ἡμί, 'half,' and πτερόν, 'a wing'), one of the orders of the class *Insecta*.

The order *Hemiptera*, according to the twelfth edition of the 'Systema Naturæ' of Linnæus, contains insects which agree in having incomplete metamorphoses (*i. e.* the larva and pupa both possess the power of locomotion, and bear a great resemblance to the perfect insect), and also in having the superior wings generally coriaceous, and the inferior membranous. Thus Linnæus included in this order the Cockroaches, Locusts, Grasshoppers, Bugs, Cicadæ, &c. The last-mentioned insects, the Bugs and Cicadæ, however, differ very materially from the former, inasmuch as they possess a suctorial instead of a masticatory mouth; and, as these latter characters have been considered of great importance by all the more modern entomologists, the term Hemiptera has been restricted to such insects as have imperfect metamorphosis and a suctorial mouth.

This definition will include the Linnæan genera *Fulgoria*, *Cicada*, *Notonecta*, *Nepa*, *Cimex*, *Aphis*, *Chermes*, *Coccus*, and *Thrips*, and these, with the addition of the genus *Pulex*, constitute the order to which Fabricius applies the name of *Ryngota*. Without the last-mentioned genus they constitute the order *Hemiptera* according to Latreille, Burmeister, and most of the foreign entomologists; and the orders *Hemiptera* and *Homoptera* according to Leach, Stephens, MacLeay, and several other British authors.

The *Hemiptera* are divided by Latreille into two sections; to the first he applies the name of *Heteroptera*, and to the second that of *Homoptera*. The *Heteroptera* are characterised by having the rostrum attached to the fore part of the head; the elytra coriaceous with the extremity membranous, folding one over the other when at rest, and the first segment of the trunk (or the prothorax) the largest, and forming the most conspicuous part of the thorax. The second section, *Homoptera* (which by many of the English entomologists is regarded as an order), is distinguished by the proboscis being attached to the lower portion of the head, near the chest; the elytra almost always of a uniform coriaceous texture, with their inner margin straight and contiguous; the three segments of the thorax are united in a mass, and the first is frequently shorter than the second. All the insects of this section feed exclusively on vegetable juices. [HOMOPTERA.] We shall at present confine our remarks to the first section, or to the true hemipterous insects, or *Heteroptera*.

The *Heteroptera* are divided by Latreille into two families; the first, or the *Geocorisæ*, are characterised as having the antennæ free, longer than the head, and inserted between the eyes and near their anterior margin. The tarsi are three-jointed, but the first joint is sometimes very short. The second family, to which the name of *Hydrocorisæ* is applied, have the antennæ inclosed and hidden in a groove beneath the eye; the tarsi have but two distinct joints, and the eyes are generally very large.

The species of the family *Geocorisæ* are for the most part found on the leaves of trees or small plants; some there are which do not quit the ground, and there are others which live upon the surface of the water. The genera *Hydrometra*, *Gerris*, and *Velia*, afford examples of this last mode of life.

The insects belonging to the second family (*Hydrocorisæ*) live, as their name implies, in the water, and they prey upon other insects.

The two families which have just been characterised are by most entomologists regarded as sections or subsections rather than families; the latter is in fact an aberrant group, the former con-

taining by far the greater portion of the species. Regarding them therefore as sections, they may be divided into the following families:

Geocorisæ.

Family 1. Scutelleridæ. Family 5. Cimicidæ.
2. Pentatomidæ. 6. Reduviidæ.
3. Coreidæ. 7. Hydrometridæ.
4. Acanthiidæ.

Hydrocorisæ.

Family 1. Nepidæ. Family 2. Notonectidæ.

HEMITONE, an interval in ancient music, the ratio of which is $\frac{243}{256}$.

HEMITRYPA, a genus of fossil *Polypiaria*, in the limestone of Devonshire, allied to Fenestella. (Phillips.)

HEMLING, HANS. [MEMLING.]

HEMLOCK. [CONIUM MACULATUM.]

HEMP. The botanical name of the hemp-plant is CANNABIS. The culture is very similar to that of FLAX. The quantity of hemp imported into Great Britain in 1846 was 882,894 cwts., of which 620,656 cwt. came from Russia.

HEMSTERHUYS, TIBERIUS, son of a French physician, was born at Groningen in 1685. In 1720 he succeeded Lambert Bos at Franeker as professor of Greek, and in 1740 removed to Leyden, where he was also professor of the same language. He contributed greatly to the revival of the study of the Greek language in Holland. He died 7th April, 1766. Among the works of Hemsterhuys are: the latter part of the edition of 'Pollux' by Lederlin, 1706; 'Latin Orations,' published by Valcknaer, 1784; and an edition of Lucian, 3 vols. 4to., which was completed by Reitz.

HENAULT, CHARLES JEAN, born at Paris in 1685, was the son of a fermier général. He showed at an early age a taste for literature, and wrote several poems. Being made intendant-general of the queen's household, he became a great favourite. He was also appointed president of the Court of Enquêtes. In 1723 he was made a member of the French Academy. At the age of fifty he withdrew from the fashionable world, and gave himself up entirely to study and devotion; but his devotion was free from moroseness or superstition. He died at Paris in 1770. The work for which Henault is best known is his 'Abrégé Chronologique de l'Histoire de France,' which is a very good model of works of that kind. He wrote also 'Histoire Critique de l'Etablissement des François dans les Gaules,' and several dramatic works collected under the title of 'Pièces de Théâtre,' 1 vol. 8vo., 1770.

HENBANE. [HYOSCYAMUS.]

HENDERSON, THOMAS, was the son of a respectable tradesman at Dundee, where he was born, December 28, 1798. After an education such as his native town could afford, he was apprenticed to a writer (or attorney) for six years. At the end of this term he was sent to Edinburgh, at the age of twenty-one, to complete his legal instruction. He was then successively secretary to the celebrated Judge John Clerk of Eldin, the Earl of Lauderdale, and the Lord advocate Jeffrey; and in these employments he continued till 1831.

During his residence at Dundee he acquired a taste for practical astronomy, as well as for the history and literature of that science; and in 1824 he began to communicate with Dr. Thomas Young, then superintendent of the 'Nautical Almanac,' whom he assisted both by methods and calculations. On the death of Mr. Fallows, the Admiralty, in 1831, proposed to Mr. Henderson to succeed him in the charge of the Observatory at the Cape of Good Hope, and the offer was accepted.

After vigorous application to his duties for little more than a year, he found his health and spirits give way, and he returned to Scotland, in 1833, with a rich store of observations, the reduction of which he imposed upon himself as a voluntary duty: among these were the observations on α^1 and α^2 Centauri, which were made with a view of determining the effect of parallax in right ascension and declination. On the recommendation of the Astronomical Society of London, to whom Lord Melbourne applied for advice, Mr. Henderson was appointed the first astronomer royal for Scotland. Here he pursued his observations and researches till his death, which took place suddenly, November 23, 1844.

HENDRED, EAST. [BERKSHIRE.]

HENLEY-ON-THAMES. [OXFORDSHIRE.]

HENLEY-IN-ARDEN. [WARWICKSHIRE.]

HENNA. [LAWSONIA.]

HENNEBON, [MORBIHAN.]

HENRI I. of France, son of King Robert, succeeded his father in July 1031, being then about twenty-seven years of age. Henri's younger brother Robert, supported by his mother and the counts of Champagne and Flanders, contended with him for the throne; but peace was made by Henri giving to Robert the duchy of Burgundy. Henri married, in 1044, Anna, daughter of Jaroslav, duke of Russia, by whom he had several sons, the eldest of whom, Philip, was crowned at Rheims in 1059, at seven years of age, by order of his father, who died in the following year, leaving Philip I. under the guardianship of Baldwin, earl of Flanders.

HENRI II., born in 1518, succeeded his father Francis I. in 1547. In 1550 he concluded the war which was then pending with England, which gave up to him Boulogne for the sum of 400,000 crowns. In 1552 Henri assisted Maurice, elector of Saxony, and Albert, marquis of Brandenburg, who had united for the defence of the religious and civil liberties of Germany against Charles V.

After the abdication of Charles V. the war continued between Philip II. and Henri, whose troops, under the command of the Constable Montmorency, were defeated by the Spaniards at the battle of St. Quentin in 1557. The French arms were likewise unsuccessful on the side of Italy, where the Duke of Alba commanded the Spaniards. The war ended in 1559, by the peace of Câteau Cambresis, by which Calais, which had been taken the year before by the Duke of Guise, remained in the hands of the French. At the same time a double marriage was concluded between Elizabeth, Henri's daughter, and Philip II. of Spain; and

between Margaret, Henri's sister, and the Duke of Savoy. The festivals given on this occasion had a tragical end. Henri was accidentally wounded at a tournament by the Count of Montgomery, with the shaft of his broken spear, which struck the king on the right eye. Henry died shortly after, July 10, 1559.

HENRI III., born at Fontainebleau, in 1551, was the third son of Henry II. In 1573 he was elected king of Poland and the successor of Sigismund Augustus. Henri was crowned at Cracow; but a few months after, upon hearing of the death of his brother Charles IX., he quitted Poland and returned to France, where he assumed the title of Henri III. His reign was a reign of unworthy favourites. When Paris revolted in favour of the Guises, Henri had recourse to assassination, and caused the Duke of Guise and his brother the cardinal to be murdered. Most of the towns of France rebelled; the parliament of Paris instituted his trial; and the Pope excommunicated him. In this emergency his generous enemy, Henri of Navarre, joined him with his army, repulsed the Duke of Mayenne, the leader of the League, and the two kings laid siege to Paris. During this siege a fanatical Dominican monk, named Jacques Clément, excited by the declamations of the Ligueurs, assassinated Henri III. at St. Cloud Aug. 2, 1589. He left no issue, and in him terminated the dynasty of Valois, which had reigned in France since the accession of Philip VI. in 1328.

HENRI IV., king of France and of Navarre, was born at Pau in the Béarn, the 15th December, 1553. His father, Antoine de Bourbon, married Jeanne d'Albret, only daughter and heiress of Henri d'Albret, king of Navarre, after whose death, in 1535, Antoine became king of Navarre in right of his wife. In 1569 Henri was acknowledged at La Rochelle as the leader of the Calvinists. After the peace of 1570 he was invited to the French court, and two years after he married Margaret, sister of Charles IX. By the death of his mother, June 1572, he became king of Navarre. At the massacre of the St. Barthélemi, which followed close upon his marriage, Henri's life was spared on condition of his becoming a Roman Catholic; but in 1576 he put himself again at the head of the Calvinists, and began a series of hazardous and hard-fought campaigns. Henri III., before he expired, named the King of Navarre as his successor. Henri however was opposed, and was obliged to raise the siege of the capital.

At last, in 1593, Henri began negotiations with several of the leaders of the League, and was induced to make a public profession of the Roman Catholic faith at St. Denis, on the 25th of July of that year. In March 1594, Paris opened its gates to him, and Rouen and other cities followed the example. The peace of Vervins, concluded in 1598, put an end to the interference of Spain in the affairs of France.

The king applied himself to reform the administration of justice, to restore order in the finances, and to promote industry and commerce. He embellished Paris, and founded the hospital of La Charité Chrétienne for invalid officers and soldiers; he added to the collection in the royal library, and encouraged and rewarded men of learning.

By the Edict of Nantes, promulgated in 1598, Henri gave what he thought a full redress of the grievances under which his Protestant subjects laboured; and such it would have proved, had not the king's intentions been frustrated in great measure by the intolerance of parliaments and courts of justice. He was assassinated by Ravaillac, May 14, 1610, and was succeeded by his son Louis XIII., under the guardianship of Mary de' Medici.

HENRICHEMENT. [Cher.]

HENRY I., king of England, surnamed Beauclerc, was the fourth and youngest son of William the Conqueror, and was born in 1068 at Selby in Yorkshire. The eldest son Robert was not favoured by his father, and succeeded him in the dukedom of Normandy, while the Conqueror, at his death, in 1087, expressed his wish that his third son William should be his successor in England, and only left Henry a legacy of 5000*l.* of silver. With 3000*l.* of this however Henry soon after obtained, from the facility of his brother Robert, the whole of the district of Cotentin, comprehending nearly a third of Normandy. When Robert and William, after having been at war in Normandy, made peace, they turned their united arms against Henry, who was compelled to evacuate even his last stronghold, the fortress built on the lofty rock of St. Michael, after which he wandered about for some two years in a state of nearly complete destitution. At length, on the invitation of the inhabitants of the town of Domfront, he assumed the government of that place; and it would appear that from this point of support he gradually raised himself to the repossession of nearly all the territory that he had lost. He also became reconciled to William, and was in England and in the New Forest with that king when he came by his death (2nd August, 1100). He was crowned on August 3, in Westminster Abbey. The next day he published a charter confirming the rights and liberties both of the church and of the nation, and promising the restoration of the laws of the Confessor, with only such alterations as had been made in them by his father. Henry from the first put forward his English birth as one of his chief claims to acceptance with his subjects; and he hastened to strengthen this title by his marriage with Maud, or Matilda, daughter of Malcolm, king of Scotland, and niece of Edgar Atheling.

The history of the reign opens with the contest between Henry and his elder brother Robert for the crown, which resulted in an agreement that Henry should retain England, and Robert Normandy, with the proviso that, if either died without legitimate issue, the survivor should be heir.

Henry however found excuses for breaking the agreement, and levied war upon his brother, the result of which was the utter ruin of Robert and his cause. He himself was taken prisoner, with 400 of his knights, and condemned by his brother to confinement for life. According to Matthew

Paris, an unsuccessful attempt which he soon after made to effect his escape was diabolically punished, by the extinction of his sight: and in this state the prince survived for twenty-eight years, dying in Cardiff Castle, at the age of eighty, in February 1135, not quite twelve months before the death of Henry. Henry was, without opposition, acknowledged their duke by the Norman barons.

The next six or seven years passed without any events of much moment. In 1113 however Henry was attacked in Normandy by Louis VI. of France, and Fulk, earl of Anjou, in support of the interests of William, styled Fitz-Robert, the son of Duke Robert. The war lasted about two years, and was on the whole adverse to Henry. It was followed by other contests which were not finally settled until 1120.

Immediately after the peace Henry's brightest hopes were dissipated by the frightful calamity of the loss, on the 25th of November, of the ship in which his son, who had been affianced to Matilda, daughter to the Earl of Anjou, had embarked at Barfleur for England: with the exception of one individual, a butcher of Rouen, all on board perished, to the number of nearly 300 persons. Henry is said never to have been known to smile after this event. Two years before this he had lost his consort; and a daughter, Matilda, married in 1114 to the Emperor Henry V., was now his only legitimate progeny. In the hope of male offspring, he (February 2, 1121) espoused the young and beautiful Adelais, or Alice, daughter of Geoffrey, duke of Louvaine.

When four or five years of his second marriage had passed without producing any issue, Henry determined upon securing the succession to his dominions for his daughter, who had become a widow in 1125. On Christmas Day, 1126, she was unanimously declared his heir, in a great council of the lords spiritual and temporal assembled at Windsor Castle. The following year she was married to Geoffrey, surnamed Plantagenet, the son of Fulk, earl of Anjou, to whom, although only a boy of sixteen, his father had resigned that earldom on his departure for the Holy Land, where he was a few years afterwards elected king of Jerusalem. It was not however till March 1133 that Henry's longings were gratified by the birth of Matilda's first child, Henry, styled Fitz-Empress, afterwards Henry II. Henry I. died at Rouen on 1st December, 1135. He had completed the 67th year of his age and the 35th of his reign.

HENRY II., surnamed Fitz-Empress, was the eldest son of Geoffrey Plantagenet (so named from a sprig of broom—in Latin, *planta genista*—in French, *plante genêt*—which he used to wear in his cap), earl of Anjou, and Matilda. [HENRY I.] He was born at Le Mans, in March 1133. In the struggle between Stephen and Matilda for the English crown [STEPHEN], Matilda's husband, Geoffrey, had, by the year 1141, reduced nearly the whole of Normandy, and his son Henry was, in 1150, formally invested with that dukedom by Louis VII. of France, the portion of the country called the Vexin being ceded to Louis as the price of his consent to such arrangement. By the death

of his father, 10th September, 1151, Henry became earl of Anjou, Touraine, and Maine. On Whitsunday of the year following, within six weeks after she had been divorced from her first husband, King Louis of France, he married Eleanor, in her own right countess of Poitou and duchess of Guienne or Aquitaine, an alliance which made him master of all the western coast of France, with the exception only of Brittany, from the Somme to the Pyrenees. Soon after this, Henry sailed for England at the head of a small but well-appointed force. He and Stephen came in sight of each other at Wallingford, and in an interview which they had there, standing on opposite sides of the Thames, agreed to a truce. The death of Eustace, Stephen's eldest son, having removed the chief obstacle to a permanent arrangement between the two competitors, the death of Stephen, Oct. 25, 1154, made Henry king of England without opposition.

His first proceedings were strikingly indicative of the system of combined energy and policy which continued to characterise his government. He dismissed the foreign troops which Stephen had brought into the kingdom, razed to the ground nearly all the numerous castles that had been erected throughout the country by the barons in the preceding twenty years of anarchy, and resumed with remorseless determination all the lands that had been alienated from the crown since the death of Henry I., the grants only excepted that had been made to the church and to William, the second son of Stephen.

His presence was now called for across the seas by the attempt of his younger brother Geoffrey to wrest from him his paternal inheritance of Anjou, Touraine, and Maine. After a very short contest Geoffrey was forced to give up his claim in exchange for a pension, but he died about a year afterwards, in 1158. Partly by force, partly by management, Henry succeeded in acquiring possession of the whole of Brittany, the only portion of territory that was wanting to complete his sovereignty over all the western coast of France. Henry had already recovered from the young Malcolm IV. of Scotland the northern counties which had been taken possession of by his predecessor David I., and had driven back the Welsh from those parts of the English territory which they had seized during the reign of Stephen. His next attempt was upon the earldom of Toulouse, which he claimed in right of his wife Eleanor, whose grandfather William, duke of Aquitaine, had married Philippa, the only child of William, fourth earl of Toulouse. He was here opposed both by Raymond de St. Gilles, the descendant of a brother of Earl William, and by Louis, king of France. The contest which ensued was suspended by a peace in May 1160, by which Henry was allowed to retain a few places he had conquered in Toulouse; and, although the war soon broke out anew, it was after a few months put an end to by a second peace, concluded in 1162 by the mediation of Pope Alexander III.

The history of the reign of Henry II. for the next eight years is principally that of his contest with the Archbishop of Canterbury. [BECKET.]

Meanwhile two formidable insurrections of the Welsh in 1163 and 1165 had been repressed. In 1166 a revolt of the people of Brittany against their duke, Conan, afforded Henry a pretext for assuming to himself the direct administration of affairs in the name of his son Geoffrey and Conan's daughter Constantia, between whom, young as they both still were, the marriage ceremony was now solemnised for the sake of this arrangement. On the 10th of September, 1167, Henry's mother, the ex-empress Matilda, died at Rouen. Some further hostilities in which he now became involved with the French king were, before producing any important result, terminated by a new peace concluded at Montmirail, 6th Jan. 1169. By this treaty it was arranged that Henry, the king of England's eldest son, should do homage to Louis for the earldoms of Anjou and Maine, and that his second son Richard should in like manner hold the duchy of Aquitaine of the French king, and espouse Adelais, or Alice, the youngest daughter of Louis. But the greatest event which divided the manifold activity of King Henry with the affairs of Becket was the conquest of Ireland, which was begun in 1169 by a body of private adventurers, headed by Richard de Clare, earl of Pembroke, the celebrated Strongbow, and completed by Henry in person, who crossed over from Milford to Waterford with a powerful armament, 18th October, 1171, and a protracted struggle ensued between the people and their invaders; but the acquisition of Ireland was finally sealed by a formal treaty concluded in 1175 with Roderick O'Connor, considered the head king of the country, in which he consented to become Henry's liegeman, and to pay an annual tribute.

Much of the remaining portion of Henry's life and reign presents an involved and deplorable scene of family discord and contention. His eldest son Henry had been, as heir apparent, crowned in Westminster Abbey on Sunday, 15th of June, 1170. On this account, at the instigation, it is said, of King Louis, the prince advanced the pretension that he had become entitled actually to share the royal power with his father, and he demanded that Henry should resign to him either England or Normandy. His refusal was speedily followed (in March 1173) by the flight first of the prince, and then of his younger brothers Richard and Geoffrey, to the French court. About the same time Queen Eleanor also left her husband to associate herself openly with the rebellion of her sons, of which she had in fact been the prime mover. She was also making her way for the French court when she was caught dressed in man's clothes and brought back to Henry, during the rest of whose life she remained in confinement. The cause of young Henry was supported not only by Louis, but also by William of Scotland, and by some of the most powerful both of the Norman and the English barons. The war continued for about two years, during which the most important event that happened was the capture of King William of Scotland at Alnwick Castle, 12th July, 1174. Soon after this, Henry, who had throughout decidedly the best of the contest, assented to the petition of his sons for a peace. In December 1174, a treaty with Scotland had been signed, by which the Scots agreed to make acknowledgment of the feudal dependence of their crown on that of England, in return for the liberation of king William. In 1183 another outbreak of the fierce and turbulent spirit of the princes led the way to a new succession of family wars. After deserting his father and his youngest brother alternately about half a dozen times, Prince Henry was suddenly taken ill, and died at Château-Martel, 11th June, 1183, in the twenty-seventh year of his age; and Geoffrey was, in August 1186, thrown from his horse at a tournament, and so severely injured that he died in a few days after. Richard, after unsuccessfully attempting to excite a new revolt in Aquitaine, was compelled to throw himself upon his father's clemency. A project of a new crusade, at the call of Pope Clement III., in the beginning of 1188, for a moment united Henry and Philip, the new king of France. The impetuous Richard actually took the cross; but before the end of the same year the unhappy father saw his son again bearing arms against him in alliance with the French king. The pretext on the part of Philip and of Richard for this new war was Henry's refusal to deliver up the princess Alice, the sister of the former, and the affianced bride of the latter, whose person as well as part of her dowry he had for many years had in his possession. Henry's spirit seems to have given way at last, and he sued for peace, which was granted on terms very humiliating to the king. Henry was stretched on a sick-bed when the treaty was read to him; but, when he found in the list of those that had deserted him to join Richard, his youngest and favourite son John, the discovery appears to have broken his heart; he turned himself to the wall, saying that all his interest in the world was over. He was soon after removed to Chinon, on the Loire; and there, after a few days more of suffering, he died, 6th July, 1189, in the fifty-seventh year of his age and thirty-fifth of his reign. He was buried in the choir of the abbey of Fontevraud.

The government of England during this reign was still nearly as despotic in principle as in the days of the Conqueror and his sons, but the more advanced social condition of the country and the firmer establishment of the new dynasty combined with the temper of the king to render it much less oppressive in practice.

HENRY III., surnamed of Winchester, was the eldest son of King John by his queen, Isabella of Angoulême, and was born 1st October, 1207. His father having died 18th October, 1216, the boy was, chiefly through the influence of the Earl of Pembroke, acknowledged heir to the throne, and on the 28th was crowned in the abbey-church of St. Peter, at Gloucester, by the papal legate Gualo. His reign is reckoned from that day.

On the 11th November following, Pembroke was appointed protector or governor of the king and kingdom. After his death the administration fell into the hands of Hubert de Burgh. In 1227 Henry had been declared of age to exercise at least certain of the functions of government;

his feeble character was already become sufficiently apparent, and this formality gave him no real power. De Burgh conducted the government with ability and success, though in a spirit of severity which could not fail to make him many enemies. A growing opposition to De Burgh was at length headed by Richard, earl of Cornwall, the king's brother, and the consequence was the sudden expulsion of that minister from all his offices, and his consignment to prison, with the loss of all his honours and estates, in the latter part of the year 1232. Des Roches, the bishop of Winchester, who had retired from the country, returned, and was now placed at the head of affairs; but a confederacy of the laity and the clergy, with Edmund, archbishop of Canterbury, at its head, compelled his dismissal. The archbishop now became chief minister. In 1236 Henry, being now in his 30th year, married Eleanor, the daughter of Raymond, count of Provence. In the midst of contests between the crown and the nobility, whose meetings for deliberation on national affairs were now commonly called parliaments, a renewal of active hostilities with France was brought about through a private resentment of Henry's mother, Isabella, who, after the death of John, had returned, and had been remarried to Hugh, count of La Marche. Henry sailed for the continent; but, after being beaten by Louis in a succession of actions, he was glad to get home again, with the loss of army, money, baggage, and everything. A new truce for five years was then agreed to between the two countries.

The contest with the crown ended for the present in an attempt on the part of Henry to govern by the prerogative. The exorbitant extent to which Henry carried his exactions raised a spirit of resistance, which broke out into open revolt. What is called by most of the old chroniclers 'the mad parliament' assembled at Oxford, June 11, 1258, and placed the whole authority of the state in the hands of a committee of government, consisting of twelve persons appointed by the barons and as many by the king. The leader of the barons on this occasion was the famous Simon de Montfort, who was a Frenchman by birth, but who, in right of his mother, had succeeded to the English earldom of Leicester, and had married Eleanor, countess-dowager of Pembroke, a sister of King Henry. He and his friends soon contrived to monopolise the whole power of the committee. The quarrels of the adverse factions enabled Henry, in the beginning of 1261, to throw off their authority, and, although the parliamentary party was on this occasion joined by Prince Edward, it was for the present effectually put down, De Montfort himself being obliged to take refuge in France. After a temporary restoration of De Montfort to power, we soon find the contending parties in open warfare, and on May 14, 1264, the forces of the barons, led by De Montfort, and those of the royalists, commanded by the king in person, and by his son Edward, met at Lewes in Sussex, where the former gained a complete victory, both Henry and his son being taken prisoners. Prince Edward contrived to make his escape from Dover Castle, and to join the Earl of Gloucester, who had now deserted the interest of De Montfort, at Ludlow, in Shropshire. On the 4th of August the two parties again encountered at Evesham; and the result was the defeat of the baronial forces with immense slaughter, De Montfort himself and his son Henry being both in the number of the slain. A final arrangement with the De Montfort party was at last effected in a parliament which met at Marlborough on the 18th of November, 1267. Henry's son Edward set out for the Holy Land in July 1270, from which he had not returned when Henry died at Westminster, Nov. 16, 1272, in the 67th year of his age and the 57th of his reign.

The reign of Henry III. is memorable as affording us the first distinct example of a parliament constituted, as at present, of representatives. Our statute law also begins with this reign.

HENRY IV., surnamed Bolingbroke, was the eldest son of John of Gaunt, duke of Lancaster, the fourth son of Edward III. His mother was the Lady Blanch, younger daughter and eventually heiress of Henry Plantagenet, duke of Lancaster, who was grandson of Edmund, second son of King Henry III. He was born at Bolingbroke in Lincolnshire in 1366. In 1397 he was created Duke of Hereford, having married Mary, daughter and coheir of Humphrey de Bohun, the last earl of Hereford.

The first occasion on which he appears in English history is as one of the lords associated with Thomas, duke of Gloucester, the uncle of Richard II., in the insurrection of 1387; and ten years after we find him accusing the Duke of Norfolk, who was also concerned in the rebellion, of having spoken disrespectfully of the king, by expressing his opinion that, although Richard had received them into his favour, he still cherished a determination of revenge. It was determined that the charge should be brought before a high court of chivalry. That court assembled at Windsor on the 29th of April, 1398, and awarded that wager of battle should be joined between the two dukes at Coventry on the 16th of September. When the day arrived, and the combatants were on the point of advancing to the encounter, the king, who presided, suddenly threw down his warder, and so arrested both where they stood. Norfolk was ordered to go on a pilgrimage to the Holy Land, and was banished from England for life; Hereford was also sentenced to quit the kingdom within four months, and to remain abroad for the next ten years. He retired to Paris, and while he was resident in that city his father, the Duke of Lancaster, died, Feb. 3, 1399, on which Richard immediately seized his estates, on the pretence that the banishment of the son disqualified him from inheriting. Henry landed with a few attendants at Ravenspur in Yorkshire on the 4th of July, while Richard was in Ireland. Henry carried everything before him, and, the deposition of Richard having been pronounced by the parliament, was on the 30th of September solemnly acknowledged as king by the estates of the realm assembled in Westminster Hall.

The new settlement was first disturbed by a

plot to assassinate the new king, which however was detected in time. Military operations were then commenced on the side both of Wales and Scotland, in the former of which countries an insurrection, headed by the famous Owen Glendwr, baffled all Henry's efforts during several successive campaigns to put down; while two Scottish armies, that marched across the borders pretending that they came to restore King Richard, who it was said was still alive and resident at the northern court, were defeated, the first on the 22nd of June, 1402, at Nesbet Moor, the second on the 14th of September in the same year, in the much more destructive fight of Homildon Hill. The victorious commander in this last affair was Harry Percy, the renowned Hotspur, eldest son of the Earl of Northumberland. That great house, conscious of its power and its services, now broke with the king of its own making, on his refusal to permit the ransoming of Henry Percy's wife's brother, Sir Edmund Mortimer, who had been taken prisoner by Glendwr. A most formidable rebellion followed, but was annihilated, 21st July, 1403, by the battle of Shrewsbury, in which Henry Percy was himself slain. Before the end of 1405 Owen Glendwr was effectually put down, and a truce with Scotland had restored quiet in that quarter. It was in the time of this truce that on the 30th of March, 1405, an English cruiser captured the ship in which James, the eldest son of King Robert of Scotland, was proceeding to France, on which Henry retained possession of the young prince, who, becoming king the following year by the death of his father, remained a prisoner in England till 1424. About the same time Henry detected a conspiracy against his life, one of the principal persons engaged in which was his cousin Edward, duke of York, whose estates were immediately forfeited to the crown; and he quelled another insurrectionary attempt of the Percies, headed by Scroop, archbishop of York, who expiated his treason by a death on the scaffold. A third northern insurrection, the last effort of the crafty old Earl of Northumberland, who had some years before been deprived of his estates and outlawed, was put down 28th of February, 1408, at the battle of Bramham Moor, near Tadcaster, in which the earl himself fell. Meanwhile an irregular war with France had been carried on, but these transactions led to no important national results during this reign.

In his latter years Henry, whose character, the more it became known, developed a harsher and more unamiable aspect, lost all the popular favour that had greeted his accession. He breathed his last on the 20th of March, 1413, in the 47th year of his age and the 14th of his reign.

Of the laws made in this reign the most memorable is the statute against the Lollards (the 2 Henry IV., c. 15).

HENRY V., surnamed of Monmouth, from the place of his birth, was the eldest son of King Henry IV., by his first wife, and was born in 1388. He was educated at Queen's College, Oxford, under the superintendence of his half-uncle, the great Cardinal Henry Beaufort. When his father was in exile in 1399, he and a son of the late Duke of Gloucester were carried to Ireland and placed in custody in the castle of Trim, where they remained till the deposition of Richard. On his father's accession he was created Prince of Wales, Duke of Guienne, Lancaster, and Cornwall, and Earl of Chester. It is said that the renown and popularity the prince acquired by his military successes in Wales so inflamed the jealousy of his father as to occasion his recall from the army, and that after this he drew upon himself as much reprobation by his wild and dissipated life as he had gained favour by his previous conduct.

Henry V. was proclaimed king on the 21st of April, 1413, the day after his father's death. He began his reign with several acts of a generous stamp—transferring the remains of Richard II. to Westminster Abbey; releasing the young Earl of March from the captivity in which he had been held all the preceding reign; and recalling the son of Hotspur from his exile in Scotland to be reinstated in his hereditary lands and honours. He had been seated on the throne little more than a year when he entered upon the enterprise of the conquest of France, which forms nearly the whole history of his reign. The claim which he advanced to the French crown was the same that had been put forward in the preceding century by Edward III., to whose rights he seems to have regarded himself as the legitimate successor in virtue of his possession of the throne, although he was certainly not the heir of that king by lineal descent. Henry, having appointed his brother, the Duke of Bedford, regent of the kingdom during his absence, set sail from Southampton, 13th August, 1415, with a force of 24,000 foot and about 6500 cavalry, in a fleet of from 1200 to 1400 vessels, and on disembarking immediately proceeded to lay siege to the strong and well-garrisoned fortress of Harfleur. It capitulated after a siege of six weeks, in the course of which time however a dysentery that broke out in their camp made a frightful devastation among the English.

On the 6th of October Henry set out on his march through Normandy, with a force which at the utmost could not have exceeded 9000 men. On the 24th he came in sight of a French army, commanded by the Constable of France and the dukes of Orléans and Bourbon, the strength of which has been variously estimated at from 50,000 to 150,000 men. The great battle of Agincourt was fought on the next day, in which the English gained one of the most complete as well as wonderful victories on record. Henry returned to France in August 1417, having under his command a magnificent army of about 35,000 men. The result of this expedition was the treaty of 'Perpetual Peace,' signed at Troyes by which all Henry's demands were agreed to, namely—the hand of Charles's eldest daughter the Princess Catherine; the present regency of the kingdom; and the succession to the throne of France on the death of Charles. Henry soon after set out with his queen for England, and on the 2nd February, 1421, entered London amidst such pageants and popular rejoicings as that capital had never before witnessed. In the course of the

same year Henry led another army into France to resist the aggressions of the Dauphin, where his arms met with their customary success. But the end of Henry's triumphant career was now at hand. The Dauphin and the Constable Buchan having laid siege to the town of Cosne, Henry, though ill at the time, set out to relieve that place, but was unable to proceed farther than Corbeil, about 20 miles from Paris, when resigning the command to his brother the Duke of Bedford, he was carried back in a litter to the Bois de Vincennes, in the vicinity of the capital, and there, after an illness of about a month, he breathed his last, on the 31st of August, in the 34th year of his age, and the 10th of his reign.

HENRY VI., surnamed of Windsor, was born 6th December, 1421, being the only issue of Henry V. by his queen the Princess Catherine of France. He was not quite nine months old when the death of his father left him king of England. The actual administration of affairs in England was intrusted to the younger of his two uncles, Humphrey, duke of Gloucester, as substitute for the elder, John, duke of Bedford, who was appointed president of the council, but who remained in France, taking his late brother's place as regent of that kingdom.

The history of the earlier and longer portion of this reign is the history of the gradual decay and final subversion of the English dominion in France. The death of Henry V. was followed in a few weeks (22nd October) by that of his father-in-law, Charles VI. Immediately on this event the dauphin was acknowledged by his adherents as Charles VII.; and Henry VI. was also proclaimed in Paris, and wherever the English power prevailed, as king of France. The next events of importance that occurred were the two great victories of Crevant and Verneuil obtained by the English over the French and their Scottish allies, the former on the 31st of July, 1423, the latter on the 17th of August, 1424.

The extraordinary succession of events that followed—the appearance of Joan of Arc on the scene; her arrival in the besieged city of Orléans (29th April, 1429); the raising of the siege (8th May); the defeat of the English at the battle of Patay (18th June); the coronation of King Charles at Rheims (15th July); the attack on Paris (12th September); the capture of Joan at Compiegne (25th May, 1430); her trial and execution at Rouen (30th May, 1431)—all belong to the singular story of the heroic maid. [ARC, JOAN OF.]

The young King of England, now in his ninth year, had in the meantime been brought to Rouen (May, 1430) and was about a year and a half afterwards crowned at Paris (Dec. 17, 1431). In 1435 the Duke of Burgundy concluded a peace with Charles, and a few days after the great Duke of Bedford died. This event gave the finishing blow to the dominion of the English in France. In April 1436, the English garrison in Paris was compelled to capitulate. In 1444 a truce was agreed upon, to last till 1st April, 1446; and in this interval a marriage was arranged between King Henry and Margaret, the beautiful daughter of René, king of Sicily and Jerusalem, and duke of Anjou, Maine, and Bar. In return for the hand of his daughter, he demanded the restoration of his hereditary states of Maine and Anjou, which were in the possession of the English, and the proposal was at length assented to. The connection seemed to be one thoroughly French in spirit, and it is no wonder that the Earl of Suffolk, by whom it had been negotiated, became from this time the object of much general odium and suspicion. The first remarkable event that followed was the destruction of the Duke of Gloucester, who, although he appears not to have openly opposed the marriage, was certainly the most formidable obstacle in the way of the complete ascendancy of Suffolk and the queen. Having been arrested on a charge of high treason, 11th February, 1447, he was on the seventeenth day thereafter found dead in his bed. His death was generally attributed to the agency of Suffolk, who now, raised to the dignity of duke, became, ostensibly as well as really, prime or rather sole minister.

Soon after hostilities were renewed in France, and, a numerous force having been poured by King Charles into Normandy, town after town was speedily reduced; Rouen, the capital, surrendered, Nov. 4, 1449; and the fall of Cherbourg, Aug. 12, 1450, completed the loss of the duchy. Before this catastrophe the Duke of Suffolk, after having been banished from the kingdom, was seized as he was sailing across from Dover to Calais, and, being carried on board one of the king's ships, was there detained for a few days, and at last had his head struck off by an executioner who came alongside in a boat from the shore, May 2, 1450. The murder of Suffolk was immediately followed by a popular insurrection. [CADE, JOHN.] Before the close of the following year the French, in addition to Normandy, had recovered all Guienne; and, with the exception of Calais, not a foot of ground remained to England of all her recent continental possessions.

The remainder of the history of the reign is made up of the events that arose out of the contest for the crown which eventually placed another family on the throne. [EDWARD IV.] The king sunk into a state of mind amounting to absolute incapacity. By the beginning of the year 1455 however he had recovered, and again took upon him the nominal administration of the government, which during his malady had been committed to the Duke of York. In the contest that soon ensued, he was taken prisoner by the Earl of Warwick at St. Alban's, 23rd May, 1455, and towards the end of that year he was again declared to be in a state of incapacity. Again however in a few months Henry recovered his health, and the government was conducted in his name till his second capture by the young Earl of March (afterwards Edward IV.) at Northampton, 10th July, 1460. On this occasion the queen escaped with her son, and eventually made her way to Scotland. The victory obtained by Margaret over the Earl of Warwick at Barnet Heath, 17th February, 1461, again liberated her husband; after which, and the issue of the battle of Towton, 29th March, which established Edward

on the throne, he retired with the queen and Prince Edward to Scotland. When Margaret again invaded England in 1462, Henry was placed in the Castle of Hardlough in Merionethshire; and here he remained till the spring of 1464, when he was brought from Wales to join a new insurrection of his adherents in the north of England. After the two final defeats of the Lancastrians at Hedgley Moor, 25th April, and at Hexham, 15th May, the deposed king lurked for more than a year in Lancashire and Westmorland, till he was at last betrayed, and seized in Waddington Hall, in Yorkshire, in June 1465. He was immediately conducted to London, and consigned to the Tower, where he remained in close confinement, till the revolution of October 1470 again restored him, for a few months, to both his liberty and his crown. He was carried from London to the battle of Barnet, fought 14th April, 1471, and there fell into the hands of Edward, who immediately remanded him to the Tower. The old man survived the final defeat of his adherents, and the murder of his son at Tewkesbury, 4th May; and a few days after an attempt which had nearly succeeded, was made by Thomas Nevil, called the Bastard of Falconberg, to break into his prison and carry him off by force. This probably determined Edward to take effectual means for the prevention of further disturbance. All that is further known is that on the 22nd of May, 1471, the dead body of Henry was exposed to public view in St. Paul's. It was generally believed however that he had been murdered by the king's brother, the duke of Gloucester, afterwards Richard III.

HENRY VII. was born at Pembroke Castle, 21st January, 1456. His father was Edmund Tudor (or rather Tydor, pronounced Tuddor, that is, Theodore), surnamed of Hadham, who had been created earl of Richmond in 1452, being the son of Sir Owen Tudor and Queen Catherine, widow of Henry V. He was thus paternally descended both from the royal house of France, and also, it is said, from the ancient sovereigns of Wales. But it was his maternal extraction that gave Henry Tudor his political importance. His mother was Margaret, the only child of John Beaufort, duke of Somerset, whose father of the same name was the eldest of the sons of John of Gaunt, duke of Lancaster, the root of the Lancastrian house, by his third wife, Catherine Swynford.

Edmund Tudor died in 1456, the same year in which his son Henry was born. Throughout the stormy period that followed, the child found a protector in his uncle Jasper Tudor, earl of Pembroke, till, on the accession of Edward IV. in 1461, the earl was attainted, and obliged to fly the country. Henry appears to have been then consigned by the new king to the charge of Sir William Herbert, Baron Herbert (afterwards created earl of Pembroke), and to have been carried by that nobleman to his residence of Ragland Castle in Monmouthshire. He is said however to have been brought to court on the restoration of Henry VI. in 1470. After the battle of Tewkesbury he seems to have been sent back to Ragland Castle, and to have remained there till his uncle, who had fled to France, returned secretly, and found means to carry him off to his own castle of Pembroke, and to embark with him at Tenby, with the intention of proceeding to France. They were forced however by stress of weather to put into a port of Bretagne, and there they were detained by the duke, Francis II., till after the accession of Richard III.

As soon as it came to be known that Edward V. and his brother no longer existed, Morton, bishop of Ely, suggested to the heads of his party that the crown should be offered to Henry on condition of his engaging to espouse the princess Elizabeth, daughter of Edward IV., and since the death of her brothers the undoubted heiress of the rights of the house of York. The scheme received the assent of the leaders of the various interests confederated against Richard. A messenger was despatched to Henry in Bretagne, September 24, 1483, and he was informed that the general rising in his favour would take place on the 18th of October. Henry sailed from St. Malo with a fleet of forty sail; but a storm dispersed the ships as he crossed the Channel, and when he reached the English coast near Poole he deemed it prudent not to land. Meanwhile the hasty ill-combined revolt of Buckingham and his associates fell to pieces without the striking of a blow. Buckingham was taken and executed as a traitor. Henry himself returned to Bretagne. At length, on the 1st of August, 1485, Henry sailed with another fleet from Harfleur, and on the 7th landed at Milford-Haven in Wales. The two rivals encountered at Bosworth in Leicestershire, on the 22nd, when Henry obtained a complete victory, which, with the death of Richard, who fell in the battle, at once placed the crown on his head. [RICHARD III.] Henry's marriage with Elizabeth was not solemnised till the 18th of January, 1486.

It was not to be expected that a reign commencing in such circumstances should be undisturbed by insurrectionary attempts. The first that occurred was headed by Francis, viscount Lovel, in April 1486, which was speedily and effectually put down. Before the end of the same year however a new and more formidable commotion was excited by the imposture of the boy Lambert Simnel, the son of a joiner at Oxford, who was put forward as Edward Plantagenet, earl of Warwick, the son and heir of the late Duke of Clarence, brother of Richard III. The brief royalty of Simnel however was terminated, June 16th, 1487, by the defeat of his adherents in the battle of Stoke. This imposture was followed after some years by the appearance of the more celebrated pretender Perkin Warbeck, who was asserted by his adherents to be Richard, duke of York, the younger brother of Edward V., and generally supposed to have been murdered along with him in the Tower. Warbeck arrived in Ireland from Lisbon in the beginning of May 1492, and was afterwards acknowledged as duke of York, or rather as Richard, king of England, not only by the Duchess of Burgundy, but by the

governments both of France and Scotland. This affair occupied Henry for the next five or six years; for it was not till the end of 1497 that the adventurer was finally put down. Another pretended Earl of Warwick next arose, one Ralph Wulford, or Wilford, the son of a shoemaker, whose attempt however was immediately nipped in the bud by his apprehension and execution, in March 1499. The same year in which Wulford was put to death witnessed the executions of both Perkin Warbeck and the Earl of Warwick. From this time Henry's reign was one of complete internal tranquillity, of which he chiefly took advantage to augment his revenue and his hoarded treasures.

Henry was early in his reign involved in the politics of the Continent by the quarrel which arose between Francis, duke of Bretagne, and Charles VIII. of France, each of whom applied to him for his assistance. This quarrel, by the death of Francis, became a contest for the possession of Bretagne by France. Charles eventually compelled the Duchess of Bretagne to marry him, after she had been affianced to Maximilian, the king of the Romans; and the duchy was thus finally annexed to the French crown. The indignation in England at this result forced Henry to conduct an army to France in person, in the beginning of October 1492; but he had already secretly arranged a peace with Charles, and before there was any fighting the treaty was published in the beginning of November. By this treaty, called the treaty of Estaples, Charles bound himself to pay Henry the sum of 149,000*l.* sterling, in half-yearly instalments of 25,000 francs.

By successive truces with James III. and James IV., the peace with Scotland was preserved till 1495. After Warbeck's final discomfiture however in 1497, a new truce was concluded between the two countries; and this led in 1502 to a treaty of perpetual peace, cemented by the marriage of James with Henry's eldest daughter, the Princess Margaret.

Nearly two years before this, namely, Nov. 14, 1501, a marriage had been solemnised between Henry's eldest son Arthur, prince of Wales, and Catherine, the fourth daughter of Ferdinand, king of Castile. Arthur however, who was a prince of the highest promise, died within six months after this time; and then it was arranged that Catherine should be married to his surviving brother Henry. The marriage of Catherine and Arthur proved still more momentous in its consequences than that of Margaret and James.

The Queen Elizabeth died Feb. 11, 1503, a few days after giving birth to a daughter; the death of Henry took place at Richmond, April 22, 1509, in the twenty-fourth year of his reign, and the 53rd of his age.

HENRY VIII., the second son of Henry VII., was born at Greenwich, 28th June, 1491. On the 1st of November following he was created duke of York, and in 1494 his father conferred upon him the honorary title of lord-lieutenant of Ireland, sir Edward Poynings being appointed his deputy. It is stated that Henry was at first destined to the archbishopric of Canterbury; 'that prudent king his father,' observes Lord Herbert (in the History of his Life and Reign), 'choosing this as the most cheap and glorious way for disposing of a younger son.' He received accordingly a learned education.

Very soon after Arthur's death the singular project was started of marrying Henry to his brother's widow. The proposition appears to have originally come from Ferdinand and Isabella, who were anxious to retain the connection with England; and to have been assented to by King Henry in great part from his wish to avoid the repayment of the dower of the princess. The final agreement between the two kings was signed 23rd June, 1503.

Henry became king 22nd April, 1509, being then in his 19th year. One of the earliest proceedings of the new reign was the trial and punishment of his father's ministers, Dudley and Empson. They were indicted for a conspiracy to take possession of London with an armed force during the last illness of the late king, and were beheaded together, on Tower Hill, 17th August, 1510.

Henry had not been long upon the throne when he was induced to join what was called the Holy League, formed against France by the Pope, the Emperor, and the King of Spain. In 1513 Henry passed over to France with an army, and, having been joined by the Emperor Maximilian, defeated the French, 4th August, at Guinegaste, in what was called the battle of the Spurs, from the unusual energy the beaten party are said to have shown in riding off the ground, and took the two towns of Terouenne and Tournay. On the 9th of September also the Scottish king James IV., who as the ally of France had invaded England, was defeated by the Earl of Surrey in the great battle of Flodden Field, he himself with many of his principal nobility being left dead on the field. This war with France however was ended the following year by a treaty, the principal condition of which was, that Louis XII., who had just lost his queen, should wed Henry's sister, the Princess Mary. The marriage between Louis, who was in his fifty-third, and the English princess, as yet only in her sixteenth year, was solemnised 9th October, 1514; but Louis died within three months, and scarcely was she again her own mistress when his young widow gave her hand to Charles Brandon, duke of Suffolk, an alliance out of which afterwards sprung a claim to the crown. [GREY, LADY JANE.]

A rivalry broke out between Richard Fox, bishop of Winchester, secretary and lord privy seal, and Thomas Howard, earl of Surrey (afterwards duke of Norfolk), who held the office of lord treasurer. This led to the introduction at court of Thomas Wolsey, who, being then dean of Lincoln, was brought forward by Fox to counteract the growing ascendancy of Surrey, and who speedily made good for himself a place in the royal favour that reduced all the rest of the king's ministers to insignificance, and left in his hands for a long course of years nearly the whole power of the state. [WOLSEY, CARDINAL.] For a short time Henry remained at peace, both with the Em-

peror Charles V., who had succeeded to the Spanish throne, and Francis; the former of whom paid him a visit at Dover in the end of May 1520; and with the latter of whom he had a few days after a seemingly most amicable interview, celebrated under the name of the 'Field of the Cloth of Gold.' But before the close of the following year Henry joined in the league with the Emperor and the Pope; and in March 1522 declared war against France. In the summer of the same year the Emperor flattered him by paying him a visit at London; his vanity having also been a short time before gratified by the title of 'Defender of the Faith' bestowed upon him by Pope Leo X. for a Latin treatise which he had published 'On the Seven Sacraments,' in confutation of Luther. Henry continued to attach himself to the interest of the Emperor, until the disappointment, for the second time, of Wolsey's hope of being made pope through the influence of Charles, is supposed to have determined that minister upon a change of politics. Before the memorable defeat and capture of Francis at the battle of Pavia, 24th February, 1525, the English king had made every preparation to break with the Emperor. In August he concluded a treaty of peace and alliance with France, and after the release of Francis, in March 1526, Henry was declared protector of the league styled 'Most Clement and Most Holy,' which was formed under the auspices of the Pope for the renewal of the war against Charles.

Before this date two domestic occurrences took place that especially deserve to be noted. The first of these was the execution, in 1513, immediately before Henry proceeded on his expedition to France, of Edmund de la Pole, duke of Suffolk, whose mother was Elizabeth Plantagenet, sister of Edward IV. He was now put to death without any form of trial or other legal proceeding, his crime, there can be no doubt, being merely his connection with the House of York. In 1521 Edward Stafford, duke of Buckingham, son of the duke beheaded by Richard III., was apprehended on some information which was furnished to Wolsey by a discarded servant, and, being brought to trial, was found guilty, and executed as a traitor. The acts with which he was charged did not according to law amount to treason, even if they had been proved; but the duke is said by certain indiscretions of speech and demeanour to have wounded the pride of the all-powerful minister. In 1527 Henry cast his eyes upon Ann Boleyn, and appears to have very soon formed the design of ridding himself of Catherine. [Boleyn, Anne.] Anne was understood to be favourably disposed towards the new views on the subject of religion. Henry himself, though he had been till now resolutely opposed to the new opinions, was carried over by his passion towards the same side. The proceedings for the divorce were commenced by an application to the court of Rome, in August 1527. For two years the affair lingered on through a succession of legal proceedings, but without any decisive result. From the autumn of 1529 are to be dated both the fall of Wolsey and the rise of Cranmer. [Cranmer, Thomas.] The death of the great cardinal took place 29th

November, 1530. In January following the first blow was struck at the church by an indictment being brought into the King's Bench against all the clergy of the kingdom for supporting Wolsey in the exercise of his legatine powers without the royal licence, and it was in an act passed immediately after by the Convocation of the province of Canterbury, for granting to the king a sum of money to exempt them from the penalties of their conviction on this indictment, that the first movement was made towards a revolt against the see of Rome, by the titles given to Henry of 'the one protector of the English church, its only and supreme lord, and, as far as might be by the law of Christ, its supreme head.' Shortly after, the convocation declared the king's marriage with Catherine to be contrary to the law of God. In August 1532, Cranmer was appointed to the archbishopric of Canterbury. In the beginning of the year 1533 Henry was privately married to Anne Boleyn; and on the 23rd of May following Archbishop Cranmer pronounced the former marriage with Catherine void. In the meantime the parliament had passed an act forbidding all appeals to the see of Rome. Pope Clement VII. met this by annulling the sentence of Cranmer in the matter of the marriage; on which the separation from Rome became complete. Acts were passed by the parliament the next year declaring that the clergy should in future be assembled in convocation only by the king's writ, that no constitutions enacted by them should be of force without the king's assent, and that no first-fruits, or Peter's Pence, or money for dispensations, should be any longer paid to the Pope. [Annates.] In the next session, the parliament, which reassembled in the end of this same year, passed acts declaring the king's highness to be supreme head of the Church of England, and to have authority to redress all errors, heresies, and abuses in the church. After this, various persons were executed for refusing to acknowledge the king's supremacy; among others, two illustrious victims, the learned Fisher, bishop of Rochester, and the admirable Sir Thomas More. [Fisher, John; More, Thomas.] In 1535 began the dissolution of the monasteries, under the zealous superintendence of Cromwell (afterwards Earl of Essex), who was constituted for that purpose visitor-general of these establishments.

Events now set in a new current. The month of May of this year witnessed the trial and execution of Queen Anne—in less than six months after the death of her predecessor, Catherine of Aragon—and the marriage of the brutal king, the very next morning, to Jane Seymour, the new beauty, his passion for whom must be regarded as the true motive that had impelled him to the deed of blood. Queen Jane dying on the 14th of October, 1537, a few days after giving birth to a son, was succeeded by Anne, sister of the Duke of Cleves, whom Henry married in January 1540, and put away in six months afterwards.

In 1536 Cromwell was constituted a sort of lord-lieutenant over the church, by the title of vicar-general, which was held to invest him with all the king's authority over the spirituality. The

dissolution of the monasteries in this and the following year, as carried forward under the direction of this energetic minister, produced a succession of popular insurrections in different parts of the kingdom, which were not put down without great destruction of life, both in the field and afterwards by the executioner. In 1538 all incumbents were ordered to set up in their churches copies of the newly published English translation of the Bible, and to teach the people the Creed, the Lord's Prayer, and the Ten Commandments, in English; the famous image of our Lady at Walsingham, and other similar objects of the popular veneration, were also under Cromwell's order removed from their shrines and burnt. In 1539 the parliament, after enacting (by the 31 Henry VIII. c. 8) that the proclamation of the king in council should henceforth have the same authority as a statute, passed the famous act (the 31 Henry VIII. c. 14) known by the name of the Six Articles, or the Bloody Statute. This statute, the cause of numerous executions, proceeded from a new influence which had now gained an ascendancy over the fickle king, that of Gardiner, bishop of Winchester, the able leader of the party in church and state opposed to Cranmer and Cromwell. [GARDINER, STEPHEN.] This new favourite was not long in effecting the ruin of the rival that was most in his way; Cromwell, who had just been created Earl of Essex, and made lord chamberlain of England, was, in the beginning of June 1540, committed to the Tower on a charge of treason, and beheaded in a few weeks afterwards.

On the 8th of August this year Henry married his fifth wife, the Lady Catherine Howard, whom he beheaded, 13th February, 1542. During this interval he also rid himself by the axe of the executioner of Margaret, countess dowager of Salisbury, the daughter of the late Duke of Clarence, and the last of the York Plantagenets. Her real crime was that she was the mother of Cardinal Pole, who had offended the tyrant, and who was himself beyond his reach.

In the latter part of the year 1542 war was declared by Henry against Scotland. The failure of his efforts to obtain possession of the government and of the young queen, Mary Stuart, led to a renewal of hostilities in the spring of 1544, when Scotland was invaded by a great army under the Earl of Hertford, which penetrated as far as Edinburgh, and burned that capital, with many other towns and villages. In the preceding year also Henry had concluded a new alliance with the Emperor against the French king; and in July 1544 he passed over with an army to France, with which he succeeded in taking the town of Boulogne. On this however the Emperor made a separate peace with Francis; and on the 7th of June, 1546, Henry also signed a treaty with that king, in which he agreed to restore Boulogne and its dependencies in consideration of a payment of two millions of crowns.

He had some years before found a sixth wife, Catherine Parr, the widow of the Lord Latimer, whom he married 10th July, 1543. As the infirmities of age and disease grew upon him, the suspiciousness and impetuosity of his temper acquired additional violence. One of his last butcheries was that of Henry Howard, earl of Surrey, who, being convicted of treason, was executed in January 1547. Surrey's father, the Duke of Norfolk, was also to have suffered on the 28th, but was saved by the death of the king at two o'clock on the morning of that day.

The most important changes made in the law during this reign were those affecting ecclesiastical affairs, of which the principal have been already noticed. Along with these may be mentioned the statute defining the degrees within which marriage should be lawful (25 Henry VIII. c. 22). The law of real property was also materially affected by the Statute of Uses (27 Henry VIII. c. 10), and by the statutes which permitted the devise, which was not before allowed, except by the custom of particular places, of real estates by will. To this reign is also to be assigned the origin of the Bankrupt Laws. Wales was first incorporated with England, and the laws and liberties of England granted to the inhabitants of Wales, in the 27th year of Henry VIII.; and Ireland, which before was styled only a lordship, was in 1542 erected into a kingdom.

HENRY OF HUNTINGDON, an ancient English historian, the son of Nicholas, a married priest, was born about the end of the 11th century, and was educated under Alcuine of Anjou, a canon of Lincoln Cathedral. He was made archdeacon of Huntingdon some time before 1123. He composed a general history of England, from the earliest accounts to the death of Stephen, A.D. 1154, in eight books, published by Sir Henry Saville among the 'Scriptores post Bedam,' fol., London, 1596. The exact time of his death is not known.

HENRY, MATTHEW, an eminent nonconformist divine, was born at a farmhouse in Flintshire, Oct. 18, 1662. His father left the Church of England in consequence of his refusal to subscribe to the Act of Uniformity. Matthew Henry received the principal part of his education under Mr. Doolittle of London. In 1685 he commenced the study of the law in Gray's Inn; but he soon relinquished this profession, and, after being ordained in 1687, settled at Chester, as minister of a Dissenting congregation. In 1712 he left Chester, and became the minister of another congregation at Hackney. He died on the 22nd of June, 1714.

The work by which Matthew Henry is principally known is his 'Exposition of the Old and New Testament,' which originally appeared in 5 vols. fol., but which he did not live to complete. He was also the author of many other works; of which the principal are, 'Inquiry into the Nature of Schism;' 'Life of Philip Henry;' 'Scripture Catechism;' 'Communicant's Companion;' 'Discourses against Vice and Profaneness;' 'Method of Prayer;' and numerous sermons on separate subjects.

HENRY, ROBERT, D.D., was the son of a farmer in the parish of St. Ninians, Stirlingshire, where he was born in 1718. Having completed his education at the university of Edinburgh, he was licensed as a preacher in 1746, being then

master of the burgh or grammar school of Annan, in Dumfriesshire. In 1748 he was elected minister of a Presbyterian congregation at Carlisle, with which he remained till August 1760, when he removed to a similar situation in the town of Berwick-upon-Tweed. In 1768, Mr. Henry removed to Edinburgh. His first appointment was as minister of the church of the New Grey Friars, which he retained till 1776, and then exchanged for the easier charge of one of the ministers of the Old Church, in which he continued till his death. His access to the libraries at Edinburgh encouraged him to proceed with a design which he had long entertained, of a 'History of England on a New Plan.' The first volume, in 4to., appeared in 1771, the second in 1774, the third in 1777, the fourth in 1781, and the fifth, bringing down the narrative to the accession of Henry VII., in 1785. The author, upon whom the degree of D.D. had been conferred by the university of Edinburgh in 1770, died in 1790; but before his death he had completed the greater part of another volume of the history, extending to the accession of Edward VI., which was published in 1793.

HENRY, WILLIAM, was the son of Mr. Thomas Henry, of Manchester, a zealous cultivator of chemical science. Dr. Henry was born on the 12th of December, 1775. His earliest instructor was the Rev. Ralph Harrison. After studying at Edinburgh and elsewhere, he received the diploma of Doctor in Medicine in 1807. He subsequently and successfully practised as a physician in Manchester, but he was compelled to retire from it on account of the state of his health.

Though pursuing the engrossing occupations of his profession, he both zealously and successfully attended to the science of chemistry, and contributed a great number of important papers to the Royal Society, the Philosophical Society of Manchester, and to various philosophical journals. He died on the 2nd of September, 1836, in his 61st year.

HENRYSON, ROBERT, a Scottish poet of much merit, lived in the latter part of the 15th century. Of his life hardly anything is known. His tale of 'Orpheus Kyng,' was printed at Edinburgh, in 1508: and in 1593 there was printed his 'Testament of Faire Creseide.' 'Robin and Makyne' is known to most readers from Percy's 'Reliques.' Other specimens of Henryson's poems are in Sibbald's 'Chronicle of Scottish Poetry,' in Dr. Irving's 'Lives of the Scottish Poets,' and in Ellis's 'Specimens.' The fullest collections of them however are in Lord Hailes's 'Ancient Scottish Poems,' 1770, and in a volume containing his thirteen poems, called 'Fables,' edited by Dr. Irving in 1832, for the Bannatyne club.

HENSLOVIA'CEÆ, a very small natural order of Exogens, according to Lindley nearly related to *Hydrangeaceæ*. *Henslovia* consists of three or four species inhabiting the tropical parts of India.

HEPA'TICÆ, a name formerly applied to a class of cryptogamic plants, part of which are popularly called Liverworts. It is now subdivided into several natural orders. [JUNGERMANNIACEÆ; MARCHANTIACEÆ.]

HEPATI'TIS. [LIVER, DISEASES OF.]

HE'PATUS, Latreille's name for a genus of brachyurous crustaceans (Crabs), placed by Milne Edwards under the tribe of *Calappians*, and, as that writer thinks, forming a link between the *Calappians* (which they resemble in the disposition of their chelæ), and the *Cancerians* (which they approach in general form), as well as the *Leucosians* (from which they differ little as regards the details of the mouth).

The only species known, viz. *Hepatus fasciatus*, and *Hepatus Chiliensis*, are inhabitants of the coasts of America; the first having been found in the north and at the Antilles, the second on the coast of Valparaiso. (M. Edwards.)

HEPHÆSTION. [ALEXANDER III., *the Great.*]

HEPHÆ'STION, a grammarian of Alexandria, lived about the middle of the second century of the Christian æra. He wrote a treatise on Greek metres (Ἐγχειρίδιον περὶ Μέτρων), the best edition of which is by Gaisford, 8vo., Oxford, 1810.

HEPIA'LIDÆ, a family of lepidopterous insects of the section *Lepidóptera nocturna* of Latreille. The moths belonging to this family are distinguished by the want of tongue, the wings being deflexed, long and narrow, and the thorax devoid of crest. Their larvæ live in the interior of vegetables, on which they feed, or in some instances they live in the ground, and feed upon the roots of plants; they are fleshy, naked, and have six thoracic, eight abdominal, and two anal feet. The pupæ have the segments of the body denticulated. The principal genera contained in this family are *Hepialus*, *Cossus*, *Stygia*, and *Zeuzera*. (Stephens' *Illustrations of British Entomology.*)

HEPTAGON, a figure of seven sides.

HEPTARCHY. [ENGLAND.]

HERACLE'UM, a genus of plants belonging to the natural order *Umbelliferæ* and the tribe *Peucedaneæ*. *H. sphondylium*, Cow Parsnip, is a native of Europe, and probably of Siberia, and is found plentifully in the meadows and hedges of Great Britain. It affords wholesome and nourishing food for cattle, and is collected in Sussex for fattening hogs; hence it is sometimes called Hog-Weed. The seeds of the plant are diuretic and stomachic, and exhale a powerful odour. *H. pubescens* is a native of Taurida in the shady places, and of the Caucasus, in alpine places. The young shoots are filled with a sweet aromatic juice which is eaten by the natives of the Caucasus in a crude state. *H. Pyrenaicum* is a native of the Eastern and Central Pyrenees, and of Italy.

HERACLI'DÆ, the descendants of Hercules. According to tradition, after the death of Hercules his children took refuge in Attica, in order to escape the persecution of Eurystheus, and they were hospitably received by Theseus. With the assistance of the Athenians, they defeated Eurystheus, and after the battle they are said to have obtained possession of the whole of Peloponnesus; but they had not remained in the country long before a pestilence again drove them back to Attica. They attempted soon afterwards to march again into Peloponnesus, but were met at the Isthmus by an army consisting of Arcadians, Ionians, and Achæans. In a single battle with Echemus, king

of Tegea, Hyllus, the eldest son of Hercules, was slain, and the Heraclidæ promised not to invade Peloponnesus for a hundred years. They did not however observe their engagement, for both Cleodæus, son of Hyllus, and his grandson Aristómachus, renewed the attempt, but without success. The Heraclidæ retreated to Doris, where they obtained a considerable army to assist them in the recovery of their dominions. With the aid of an Ætolian chief named Oxylus, they crossed from Naupactus to the southern side of the Corinthian Gulf eighty years after the Trojan War. (Thucyd. i. 12.) A battle took place between the Dorians under the command of the sons of Aristómachus and the Peloponnesians under that of Tisamenus, the grandson of Agamemnon, in which the latter were defeated, and all Peloponnesus, except Arcadia and Achæa, fell into the hands of the Heraclidæ. Elis was assigned to Oxylus, and the rest of the Peloponnesus was divided among the three sons of Aristomachus; Temenus obtained possession of Argos, Cresphontes of Messenia, and Aristodemus, or his sons Eurysthenes and Procles (for according to the general tradition Aristodemus did not live to enter Peloponnesus) of Lacedæmon. The land of the conquered country was divided among the Dorians, and the old inhabitants were obliged to emigrate, or were reduced to an inferior caste.

Such is the traditional account of that important event in Grecian history, usually called 'the return of the Heraclidæ,' by which the Dorians obtained possession of the greater part of the Peloponnesus. Though the general tradition assigned the complete conquest of Peloponnesus to the sons of Aristomachus, it appears probable from other traditions that the greater part of the Peloponnesus was not reduced by the Dorians till long afterwards. (Thirlwall's 'Hist. of Greece,' vol. i. pp. 262—273.)

HERACLI'TUS of Ephesus, surnamed the Naturalist (φυσικός), belongs to the dynamical school of the Ionian philosophy. He is said to have been born about B.C. 500, and he died in the sixtieth year of his age. The title he assumed of 'self-taught' refutes the claims of the various masters whom he is said to have had, and the distinguished position that he held in political life attests the wealth and lustre of his descent. The gloomy haughtiness and melancholy of his temperament led him to despise all human pursuits, and he expressed unqualified contempt as well for the political sagacity of his fellow-citizens as for the speculations of all other philosophers, as having mere learning and not wisdom for their object. Of his work 'On Nature' (περὶ φύσεως), the difficulty of which obtained for him the surname of 'the obscure', many fragments are extant, and exhibit a broken and concise style, hinting rather than explaining his opinions.

According to Heraclitus, the end of wisdom is to discover the ground and principle of all things. He maintains that the rational principle which governs the whole moral and physical world is also the law of the individual; whatever therefore is, is the wisest and the best; and 'it is not for man's welfare that his wishes should be fulfilled; sickness makes health pleasant, as hunger does food, and labour rest.'

The physical doctrines of Heraclitus formed no inconsiderable portion of the eclectical system of the later Stoics, and in times still more recent there is much in the theories of Schelling and Hegel that presents a striking though general resemblance thereto.

The fragments of Heraclitus have been collected from Plutarch, Stobæus, Clemens of Alexandria, and Sextus Empiricus, and explained by Schleiermacher in Wolf and Buttmann's 'Museum der Altherthumswissenschaft,' vol. i. See also Brandis's 'Handbuch der Geschichte der Griechisch-Röm. Philos.,' Berlin, 1835; and Ritter's 'History of Ancient Philosophy,' Oxford, 1837.

HERA'CLIUS, the son of the patrician Heraclius who was governor of Africa under the Emperor Phocas, assisted in dethroning the latter A.D. 610, and was proclaimed emperor in his place. He applied himself to reform the discipline of the army; he renewed the truce with the Longobards of Italy, and turned his arms against the Avari, who had invaded Thrace, and had advanced to the gates of Constantinople. Those barbarians soon after retired across the Danube loaded with their spoils. The Persians meantime invaded Syria, devastated Jerusalem, and made an irruption into Egypt, in consequence of which the large supplies of corn which that country used to send to Constantinople were stopped, and the capital was afflicted by a severe famine. Another Persian army had advanced through Asia Minor to Chalcédon, but Heraclius induced the commander to withdraw, and sent ambassadors to treat of peace with Khosru, the Persian king, who spurned his offers, and summoned Heraclius and his subjects to abjure Christ and pay worship to the sun. Heraclius, roused by this insult, collected an army, and marched against the Persians, whom he defeated in a succession of brilliant campaigns, and pursued them as far as the Tigris, A.D. 622—27. The first year of the expedition of Heraclius against the Persians was the same in which Mohammed openly assumed the character of prophet and legislator, after his flight to Medina. Khosru was at last dethroned by his son Siroes, who concluded peace with Heraclius. The latter years of the reign of this emperor were passed amidst theological controversies. Heraclius supported the doctrine of the Monothelites, who taught that the human nature in Jesus Christ was entirely passive under the will of his divine nature. Pope John IV. assembled a council at Rome A.D. 640, which condemned the Monothelites. Meantime the Arabians, after the death of Mohammed, and under the caliphate of Abu Bekr, invaded Syria, Palestine, and Mesopotamia, and under the following caliphate of Omar they conquered Egypt and Cyrenaica. Heraclius was unable to oppose the torrent of Arabian courage and fanaticism; he sunk into inactivity and sloth, and died of the dropsy in February 1641, after a reign of thirty years. From that epoch the decided though gradual decline of the Eastern empire may be dated. Heraclius was succeeded by Heraclius Constantine, his son by his first

wife Eudocia, who in the fourth month of his reign was poisoned by his step-mother Martina, who had her own son Heracleonas proclaimed in his stead. An insurrection however soon after broke out at Constantinople against the new emperor, who was mutilated and banished together with his mother; and Constans II., son of Heraclius Constantine, was raised to the imperial throne. (Theophanes and other Byzantine historians; Gibbon.)

HERALD, an officer whose duty, during the middle ages, was to carry challenges or peaceful messages from one prince or nobleman to another, to proclaim peace or war, to lay out the lists in jousts or tournaments, to be the witness of all combats, and to record in writing the names of those who behaved most valiantly, to number the dead after battle, and specially to supervise all matters connected with the bearing of coat-armour, the marshalling of processions, and other state ceremonies. His functions were something like those of the Greek *kerux* (κήρυξ), and the Roman *Fecialis;* but the origin of the name is much disputed, and the actual date of the institution uncertain. The earliest mention of a herald in England is in a pell-roll of the 12th Edward III.; but there is little doubt that the office existed as early at least as the dawn of hereditary coat-armour. The English heralds were first incorporated by Richard III. [HERALDS' COLLEGE.] There are three orders or grades of heralds, namely, kings of or at arms, heralds, and pursuivants. They were anciently created with much ceremony, and the mode is curiously detailed by Gerard Legh apud Upton.

Modern heralds of all classes are now made and appointed by the earl marshal. The present number in England is fourteen. Four kings of arms—Garter, Clarencieux, Norroy, and Bath. The second and third are provincial kings; Clarencieux has power over all parts of England south of the Trent, and Norroy over all parts north of it. Six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York. Four pursuivants—Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. In Scotland there is one king at arms, named Lyon; and in Ireland one, named Ulster. To these regular officers are sometimes added, by command of the king to the earl marshal, a herald or pursuivant extraordinary.

HERALDS' COLLEGE, or COLLEGE OF ARMS, a corporation founded by Richard III. in the first year of his reign by a charter dated the 2nd of March, 1483, in which he gives to the principal officers of the corporation a house called Colde Arbor, in the parish of All Hallows the Less, London. In the first year of the reign of Henry VII. this house was seized into the king's hands under the Act of Resumption as the personal property of John Writhe, then garter king at arms. During the reign of that king and of his successor Henry VIII. the heralds made several unsuccessful attempts by petition to obtain a restoration of it, or the grant of some other building for their general use. King Edward VI., in the third year of his reign, by a charter dated June 4th, confirmed to them all their ancient privileges; and Philip and Mary, by charter of the 18th of July, 1554, re-incorporated them, and granted to them Derby House, then occupying the site of the present college on St. Benet's Hill, near St. Paul's Churchyard. The old building was destroyed in the great fire of London, but all the books, papers, &c., were saved, and removed to the palace in Westminster, where the heralds held their chapters, &c., until the college was rebuilt. The corporation consists of the three kings at arms—Garter, Clarencieux, and Norroy (Bath not being a member), six heralds, and four pursuivants. [HERALD.] There is a heralds' college in Scotland, composed of Lyon king at arms, six heralds, and six pursuivants.

HERALDRY, the art of arranging and explaining in proper terms all that appertains to the bearing of coats of arms, badges, and other hereditary or assumed marks of honour; also the art of marshalling processions and conducting the ceremonies of coronations, instalments, creations of peers, funerals, marriages, and all other public solemnities.

The origin of heraldry, in the first and most commonly understood sense, has been attributed, by the general consent of the best writers on the subject, to the necessity for distinguishing by some outward sign, amidst the confusion of battle, the principal leaders during the expedition for the recovery of the Holy Land. But nothing is absolutely known concerning it beyond the fact that the middle of the 12th century is the earliest period to which the bearing of heraldic devices properly so called can be traced; and the commencement of the 13th, the time about which they became hereditary.

The earliest roll of arms of which we have any notice is of the reign of Henry III.; and the reign of Edward I. presents us with the earliest heraldic document extant. The famous roll of Caerlaverock, a poem in old Norman French, rehearses the names and armorial ensigns of all the barons, knights, &c., who attended Edward I. at the siege of Caerlaverock Castle, A.D. 1300. Heraldry is therein first presented to us as a system. The principal rules and terms of the art were then in existence, and from about that time the terms are continually found in the fabliaux and romances of France and England.

The oldest writer on heraldry whose work has descended to us is Nicholas Upton, whose treatise 'De Militari Officio' was composed in the reign of Henry V., and translated in that of his successor by Juliana Berners, in the work known as the 'Boke of St. Albans.' As Upton quotes no earlier authorities, his definitions and explanations can only be looked upon as assertions made nearly 300 years after the origin of the practice, and consequently to be believed or not, according to the discretion of the reader. In the reign of Richard III. the English heralds were incorporated and the college of arms founded, and in the following century a swarm of writers arose, both in France and England, each contradicting the other, and wasting much learning and research in the most absurd and idle controversies.

On the decline of chivalry the study of heraldry

became gradually neglected, and the art, which had formed for centuries a portion of the education of princes, and occupied the attention of some of the most learned men in Europe, was abandoned to the coach-painter and the undertaker, while kings of arms and pursuivants were looked upon as mere appendages of state pageantry, their office ridiculed, and their authority defied.

That the pedantry of such writers as Morgan, Ferne, Mackenzie, and others, contributed to these results, there can be little doubt. A taste for the critical study of antiquities generally is now however reviving throughout Europe, and the use of heraldry as a key to history and biography is daily becoming more acknowledged.

The rules of heraldry as now practised at the college of arms are, as we have before remarked, comparatively modern, and vary in some points from those observed in France and Germany.

According to the received authorities there are ten classes of arms.

1. Arms of *Dominion*, being those which princes bear as annexed to the territories they govern.

2. Of *Pretension*, those borne by princes who are not in possession of the dominions to which such arms belong, but who claim or pretend to have a right to such possession; as, for instance, the kings of England from Edward III. to George III. quartered the arms of France.

3. Arms of *Community*, being those of bishoprics, cities, universities, and other bodies corporate.

4. Of *Assumption*, such as are assumed by a man of his proper right without the grant of his prince, or of a king at arms: as, for instance, when a man of any degree whatsoever has taken prisoner, in lawful war, any gentleman, nobleman, or prince, he may bear the arms of that prisoner, and transmit them to his heirs for ever.

5. Arms of *Patronage*, such as governors of provinces, lords of manors, patrons of benefices, &c., add to their family arms, as a token of their superiority, rights, and jurisdiction.

6. Arms of *Succession*, borne by those who inherit certain estates, manors, &c., either by will, entail, or donation.

7. Arms of *Alliance*, such as the issue of heiresses take up to show their maternal descent.

8. Arms of *Adoption*, borne by a stranger in blood, with the special permission of the prince, applied for in order to fulfil the will of the testator who may bequeath certain moneys or estates on condition of the party's assuming his name and arms.

9. Arms of *Concession*, augmentations granted by the prince of part of his own ensigns or regalia to such persons as he pleases to honour therewith.

10. Arms *Paternal* and *Hereditary*, such as are transmitted from the first possessor to his son, grandson, great-grandson, &c.; thereby forming complete and perfect nobility. The son being a gentleman of second coat-armour, the grandson a gentleman of blood, and the great-grandson a gentleman of ancestry.

These several sorts of arms are displayed on shields or escutcheons, and on banners, the ground of either being called the field, and the figures borne upon it the ordinaries and charges.

HERAT. [AFGHANISTAN; PERSIA.]

HE'RAULT, a department in the south of France, formed out of a portion of Bas-Languedoc, is bounded N. by the departments of Aveyron and Gard, E. by that of Gard, S. by the Gulf of Lyon and the department of Aude, and W. by the departments of Aude and Tarn. Its greatest length from E. to W. is 84 miles, from N. to S. 49 miles. The area is 2411 square miles, and the population in 1841 was 367,343; which gives 152.36 to the square mile, being 15.64 below the average per square mile for the whole of France.

The department is traversed in the north and north-west by the lower CE'VENNES, which attain the height of 4198 feet in the Espinouse range on the confines of Tarn, and of 4264 feet in the chain of Larzac, or Larjac, extending N. of Lodève into the department of AVEYRON. From the main chain several ranges of hills of moderate elevation branch off towards the south, gradually subsiding as they approach the sea. The cultivable soil of the north and north-west consists of a chalky clay which produces only rye. The higher mountains are in general barren, or covered with woods. The plains in the interior, some of which are of large extent, consist of a light gravelly soil, very favourable to the growth of the vine and the olive. Along the lower courses of the Orb, the Hérault, and the Vidourle, and generally in the south of the department, the soil is strong, deep, rich, and very productive in all the cereal grains. Here and there, all through the department, there are extensive wastes, locally called *garrigues*, thinly covered with shrubs, dwarf oak, heath, broom, cistus, and aromatic plants, and producing tolerable pasture. The department presents abundant evidence of volcanic action at some distant period, particularly in the extinct craters of Agde and of St.-Thibéry, near Pézenas, and in the basaltic hills near Montpellier.

The coast line, extending from the mouth of the Aude to that of the Vidourle, measures 66 miles in length. The salt lagunes of Thau, Maguelonne (so called from the ancient city of Maguelonne, which stood on the peninsula of Maguelonne, and of which there remains a very interesting church), Pérols, and Mauguio extend eastward from Agde to the Vidourle; they are separated from the Mediterranean by a narrow bank, in which however there are a few openings called *graus*. The Canal-des-Etangs, which joins the Canal-du-Midi at Cette, passes through these lagunes. In the west of the department are the lagunes of Vendres and Capestang; the latter is land-locked and stagnant. The neighbourhood of all these lagunes is marshy and unhealthy; agues and rheumatic fevers prevail in the summer and autumn, though to a less extent than formerly, owing to the partial drainage and cultivation of the marshes. Except in the vicinity of the lagunes, the department enjoys a pure air and a most healthy climate.

The rivers of the department all rise in the Cévennes, and flow directly into the Mediterra-

nean or into the lagunes. The principal are—the *Vidourle*, on the confines of GARD: the *Lez*, which passes E. of Montpellier, and becoming navigable takes the name of Canal-de-Grave: the *Hérault*, which gives name to the department; rising in the north-west of Gard, and running south, it enters the department of Hérault at Ganges; here, having received the Ergue on the right bank, it passes Montagnac and Pézenas, and enters the sea through the port of Agde after a course of 80 miles, only 7 of which are navigable: the *Orb*, which, springing from the mountains W. of Lodève, and flowing first S., then W. till it meets the Jaur at Olargues, and finally S.S.E., passes Béziers, having previously received the Bernasobre from the west, and enters the sea near St.-Geniès; and the AUDE, which touches the western boundary. Near the coast, most of the towns are joined to the Canals-du-Midi and des-Etangs by short canals, thus establishing a communication with Beaucaire and the towns on the Rhone [GARD] and the Garonne, and with the Gulf of Gascogne.

The department is crossed by the high road from Paris to Spain, through Perpignan, by 5 other royal and 17 departmental roads. Montpellier, the capital, communicates with Cette and Nîmes by railroad. [GARD; CETTE.]

The department contains 1,542,888 acres, divided among 120,616 proprietors, and into 1,088,213 parcels. Of this area 386,897 acres are arable land; 256,213 are under vineyards; 191,869 are covered with woods; 21,096 are meadows and grass land; 71,065 are under orchards, olive and mulberry plantations, nurseries, and different kinds of culture; 58,593 are covered with lagunes, rivers, canals, and marshes; and 528,923 acres consist of the waste land or garrigues described above.

Wheat, rye, barley, and oats are produced in quantity more than sufficient for the consumption. There is a considerable breadth of artificial meadows; and large crops of lucern, sainfoin, and clover are grown. For quantity of wine produced, Hérault stands at the head of the wine-growing departments of France, the average annual produce being 46,552,000 gallons. The red wines of St.-Georges, St.-Christol, and St.-Drézéry, the muscadel wines of Frontignan, Lunel, and Béziers, and the white wines of Marseillan and Pinet, are considered the best. Fruits, especially raisins, olives, almonds, figs, and chestnuts, and all kinds of pulse, are grown. The mulberry is cultivated for the production of silk; aromatic and medicinal herbs, and plants used for dye-stuffs, are gathered. The principal material of the woods are the chestnut and green and white oak. Sheep, cattle and mules are numerous; game is very abundant; and fish, including the johndoré, tunny, oyster, lobster, anchovy, mackerel, eel, &c., are taken in immense quantities in the lagunes and in the sea.

The industrial products comprise woollen cloths, silks, hosiery, calico, muslin, flannel, blankets, brandy, chemical products, pottery, tiles, honey, perfumes, leather, oil, beer, paper, &c. There are also numerous dye-houses, and magnaneries for the rearing of silkworms. Ship-building is carried on at Cette and other towns on the coast. Mines of coal and copper, quarries of marble, building and mill stone, slate, gypsum, and granite are worked. A vast deal of salt is made by evaporation on the lagunes and on the shore of the Mediterranean, this department being one of the chief sources for the supply of that article to France. The exports consist of most of the articles enumerated, but chiefly of wine, dry fruits, and brandy. The imports are wool, cotton bales, staves, colonial produce, raw hides, cork, &c. The principal sea-ports are CETTE and Agde. There are 545 wind and water mills, 11 iron forges and foundries, and 861 factories of different sorts. About 100 fairs are held annually.

The department is divided into 4 arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1841.
Montpellier .	14	117	131,815
Béziers . . .	12	97	131,033
Lodève	5	75	55,849
St.-Pons . .	5	44	48,646
Total . .	36	333	367,343

Of the arrondissement of Montpellier, and of the whole department, MONTPELLIER is the capital. *Aniane*, a pretty little town, 16 miles N.W. from Montpellier, is situated in a rich plain on the left bank of the Hérault, and has 2542 inhabitants, who manufacture cream of tartar, verdigris, black soap, chemical products, cotton-yarn, leather, and lime. This town owes its origin to the abbey built here by St. Benedict in the 9th century; the abbey (now the parish) church is an elegant structure; the abbey buildings are turned into a cotton factory. CETTE. *Frontignan*, a small town with 2000 inhabitants, situated on the lagune of Maguelonne, and on the Montpellier and Cette railroad, is famous for the excellent muscadel wines and raisins produced in its neighbourhood. Near Frontignan is *Balaruc*, famous for its warm springs which have enjoyed a long celebrity for the cure of paralytic and scrofulous affections. The bathing establishments, furnished hotels for the accommodation of visitors, and a general hospital for poor patients, forming a pretty village, stand on the northern shore of the lagune of Thau. There are two seasons, May and June, September and October. *Ganges*, 25 miles N. from Montpellier, is prettily situated in a fertile plain closed in by high hills, and on the left bank of the Hérault. It is surrounded by pretty country houses, and commanded by an old castle. The population amounts to 4564, and the chief manufactures are silk and cotton-yarn, silk stockings, silk gloves, and leather. Near the town there is a very extensive grotto, which is said to surpass in beauty the famous grotto of Antiparos. A great deal of raw silk is produced in the canton of Ganges. *Lunel-la-ville*, 14 miles E. from Montpellier, and on the railroad from that city to Nîmes, stands near the right bank of the Vidourle, in a district famous for its sweet wines, and has 6385 inhabi-

tants. The most attractive objects in the town are the barracks, a fountain in form of an obelisk, and the public promenade. It has communication by the Lunel Canal, which terminates in the lagune of Mauguio, with the Rhone, the Mediterranean, and the Canal-du-Midi. There are several brandy, spirit, and liqueur distilleries; and the trade in corn, flour, wool, wine, raisins, manufactured goods, and colonial produce is considerable. *Massillargues*, or *Marsillargues*, 16 miles E.N.E. from Montpellier, on the Vidourle, is situated in a very fertile district; it has a fine old castle, and 3529 inhabitants. *St.-Martin-de-Londres*, 17 miles N.N.W. from Montpellier, is a small place of only 1100 inhabitants, but interesting for the remains of its feudal fortifications, and for the old castle of La-Roquette, which stands on an eminence near the Pic-St.-Loup, a volcanic mountain nearly 2000 feet high. Silk hosiery and charcoal are manufactured here. *Mauguio*, 7 miles from Montpellier, stands on the lagune of Mauguio, has some brandy distilleries, and 2131 inhabitants. In the middle of the town there is a hill, surmounted by a windmill, from which Aigues-Mortes and Cette, on the coast of the Mediterranean, and to the northward the Cévennes are visible. *Mèze*, 19 miles S. from Montpellier, stands in a productive vine district on the lagune of Thau, where it has a good harbour for small craft. It is a pretty town with 4348 inhabitants, who manufacture liqueurs, brandy, and salt, and trade in these articles, and in wine, corn, &c., The ancient abbey of Vallemagne, the church and cloisters of which are still entire, stands near Mèze, and forms one of the finest Gothic structures of the kind in France.

In the arrondissement of Béziers, the chief town, *Béziers*, stands on a hill above the Orb and the Canal-du-Midi, in 43° 20′ N. lat., 3° 12′ E. long., 46 miles S.W. from Montpellier, and has 18,874 inhabitants. The streets are narrow and ill-laid out, but the houses are in general well built of stone. It contains several buildings interesting for their architecture or their antiquity; the principal are the cathedral of St.-Nazaire; the churches of St.-Aphrodise and La-Madeleine; the former episcopal palace which now serves for the residence of the sub-prefect, and for courts of justice; the public library; the house of Pierre-Paul Riquet, the engineer of the Canal-du-Midi; the market house; and the barracks. The town has tribunals of first instance and of commerce, and a college. The manufactures consist of woollen cloth, silk hosiery, brandy, spirits, liqueurs, chemical products, thrown silk, soap, leather, paper, glass, &c.; the commerce of the town consists of these articles and of corn, wool, iron, wine, oil, fruits, &c. A steam-engine raises the waters of the Orb to a considerable height into a reservoir on the terrace, near the cathedral, whence the different quarters of the town are supplied. The Canal-du-Midi is carried through 9 locks close to the town. The town of Béziers is ancient; it contains a few Roman remains, and is noted for the massacre of the Albigenses, July 22, 1209. *Agde*, a seaport and fortress at the embouchure of one of the branches of the Canal-du-Midi, and on the left bank of the Hérault, which is crossed by a suspension bridge, has a tribunal of commerce, a remarkably beautiful Gothic church, an exchange, a harbour for vessels of 200 tons, and 8202 inhabitants. The harbour is formed by the channel of the Hérault, which has a depth of 16 feet, and is lined with quays formed of lava all the way to the sea. The fortifications, public buildings, and the houses are constructed of black basalt, and the streets are paved with volcanic products got from the Mont St.-Loup. The town stands about 2 miles from the Mediterranean; it has an active coasting trade and fishery, a lighthouse of the first class, a school of navigation, and slips for building trading-vessels: soap, verdigris, and brandy are the chief manufactures; the commerce is composed of these articles, and of wine, oil, fish, timber, iron, cordage, pitch and tar, corn and flour. About 120 vessels of 100 to 200 tons belong to the town. *Bédarieux*, a well-built manufacturing town on the left bank of the Orb, which separates it from one of its suburbs, stands 18 miles N. from Béziers, and has a college, a council of prud'hommes, and 9012 inhabitants. Fine and coarse woollens, cotton and woollen hosiery, hats, soap, olive-oil, leather, and paper are manufactured. There are also dye-houses, glass works, and a copper foundry. The trade in wine and in the articles just named is extensive and important. *Capestang*, which gives name to the lagune of Capestang, stands on the Canal-du-Midi, and has 2000 inhabitants. *Florensac*, situated near the left bank of the Hérault in a rich district of vine and meadow land, has a population of 3454. *St.-Gervais*, a small town of 2573 inhabitants, is situated in a well-watered valley shut in between four hills, 23 miles N. from Béziers. There are excellent coal mines near the town, and also marble quarries, and lime kilns. *Montagnac*, the birthplace of Latude, celebrated for his long captivity in the Bastille, stands on the left bank of the Hérault, and has brandy distilleries, some unimportant manufactures, and 3466 inhabitants. *Murviel*, on a hill above the Orb, 8 miles from Béziers, has a population of 1595. *Pézenas*, an ancient town situated near the left bank of the Hérault, at its junction with the Peine, has a tribunal and chamber of commerce, an exchange, a college, and 7759 inhabitants. The town is well built, with pretty wide streets and good houses; the parish church and the theatre are the most remarkable buildings. The neighbourhood of the town is remarkably beautiful, and so well cultivated as to have gained the title of the Garden of Hérault. Pézenas is celebrated for its salubrity; several craters, now extinct, and masses of basalt, are seen near it. It was in this town that Molière wrote his 'Précieuses Ridicules.' The manufactures are linen, muslin, calico, woollen stuffs, hats, soap, chemical products, syrup and sugar of grapes, cotton yarn and raw silk. There are also brandy and spirit distilleries, establishments for washing wool, and a considerable commerce in corn, olive-oil, fruits, &c. *Roujan*, a small place in a volcanic district, near the right bank of the Peine, has a population of 1627; near it there are exten-

sive coal mines, and also cold mineral springs. *Servian*, 6 miles N.E. from Béziers, has 2203 inhabitants. There is a castle here, the construction of which dates from the 11th century.

In the arrondissement of Lodève, the chief town *Lodève*, situated in a valley at the foot of the Cévennes, on the left bank of the Ergue, which here receives the Salondres, is 32 miles N.W. from Montpellier, and contains 10,477 inhabitants. It is the seat of tribunals of first instance and of commerce, and has also a chamber of commerce, a college, and a council of prud'-hommes. The town is surrounded by strong walls, but the interior is badly built and ill laid out. The approaches to it are by avenues of fine trees. The air is pure, and the environs delightful; the hills around it are cultivated to their very summits, and plantations of the vine, the olive, and the mulberry everywhere meet the view. The most remarkable building in Lodève is the former cathedral church of St.-Etienne, which contains a beautiful mausoleum in white marble of one of the bishops of Lodève. The town is the centre of a great cloth manufacture, and is celebrated for its piece-dyed goods, which are exported to the Levant. Soldiers' uniforms, and other woollen stuffs, soap, leather, &c., are also made. *Clermont-Lodève*, 10 miles S. from Lodève, stands on the slope of a hill above the little river Ydromiel, and contains 6294 inhabitants. A college, a tribunal of commerce, a council of prud'hommes, and a savings' bank are the principal institutions of the town. The most remarkable building is a handsome Gothic church with three naves, a very lofty tower, and, over the principal entrance, a rose window of noble dimensions. The principal manufacture is piece-dyed cloth; but woollen and cotton hosiery, handkerchiefs, cotton yarn, leather, brandy, and chemical products are also manufactured. *Gignac*, near the left bank of the Hérault, is situated 15 miles S.E. from Lodève, in a country covered with vineyards, olive grounds, and mulberry plantations, and has 2669 inhabitants, who manufacture verdigris, olive oil, sugar, brandy, and woollen yarn, and trade in agricultural produce. *Lunas*, 6 miles from Lodève, has a population of 1504.

In the arrondissement of St.-Pons, the chief town, *St.-Pons*, stands on the Jaur, a feeder of the Orb, 60 miles W. from Montpellier, and has 7128 inhabitants. It is a well built town; most of the houses are constructed of marble from the neighbouring quarries. The church of St.-Pons, which is classed as an historical monument, is one of the most interesting in the department. Within the town the Jaur receives the waters of a very abundant spring, which forms a vast basin of considerable depth; in front of this there are two immense elms, on the right a church built in the time of Charlemagne and well preserved, and on the left a Gothic tower. The town has a tribunal of first instance, a college, and an ecclesiastical school; the waters of the Jaur drive the machinery of several corn and fulling mills, saw-works, dye-houses, &c. There are important manufactures of woollen cloth in this town; hosiery, woollen yarn, and leather are also made; and there is a good trade in corn, cattle, and marble. *St.-Chinian*, important for the manufacture of piece-dyed woollen goods, brandy, and leather, stands in a rich valley watered by the Bernasobre, 12 miles S.E. from St.-Pons, and has 3627 inhabitants. *Olargues*, 10 miles N.E. from St.-Pons, on the Jaur, a feeder of the Orb, has a population of 1161. *Olonzac*, 16 miles from St.-Pons, near the Canal-du-Midi, has 1411 inhabitants. *La-Salvetat*, 7 miles N.N.W. from St.-Pons, is situated among high mountains, near the right bank of the Agout, a feeder of the Tarn, and has a population of 4009, who manufacture flannel, woollen cloth, woollen yarn, and swanskin, and trade in wool, cattle, and the excellent butter of the neighbourhood, which is considered the best in all Languedoc.

The department forms the see of the bishop of Mnotpellier is included in the jurisdiction of the Cour Royale and University Academy of Montpellier, and belongs to the 9th Military Division, of which Montpellier is head-quarters. To the Chamber of Deputies it returned 6 members; it now has 10 representatives in the National Assembly.

Dictionnaire de la France; Annuaire pour l'An 1847; *Statistique de la France; Decree of the Provisional Government of the French Republic;* Richard, *Guide Classique du Voyageur en France et en Belgique.*

HERBART, JOHANN FRIEDRICH, was born in 1776, at Oldenburg, where his father at the time held an office connected with the administration of justice. Receiving his religious instruction from a man well acquainted with the philosophical systems of Leibnitz and Kant, Herbart, at the age of about twelve, was led to speculate upon such subjects as God, freedom, and immortality. In his eighteenth year he went to the University of Jena, where he studied under Fichte, and formed an intimate acquaintance with him, and he entertained the highest opinion of his master until Schelling's work, 'Vom Ich' (Of the I), fell into his hands, which was admired by Fichte, while Herbart opposed its tendency with the greatest zeal. This caused a breach between Fichte and Herbart, who gladly accepted a place of private tutor which was offered to him at Berne in Switzerland. He had already conceived the idea of a system of psychology based upon mathematics, and the more clearly Fichte explained his views upon psychology in his 'Sittenlehre' (Doctrine of Morals) (Leipzig and Jena, 1798), the more Herbart became convinced that the speculations of Fichte must be abandoned if any permanent basis was to be gained for his science. About the same time he devoted himself to the study of ancient philosophy, which led him to form an intimate acquaintance with the systems of Plato and the Eleatics. From 1802 to 1805 he delivered philosophical lectures in the University of Göttingen, where he developed his peculiar method of thinking. His tendency was pre-eminently practical, and it was partly owing to this circumstance, and partly to his personal acquaintance with Pestalozzi, that his first work treated on education. In 1809 he was appointed

professor of philosophy at Königsberg, and was at the same time intrusted with the superintendence of the higher educational establishments in the eastern parts of Prussia, in the organisation of which he did great service. In 1833 he was invited to the chair of philosophy in the University of Göttingen, where his lectures attracted great attention on account of the clearness and precision with which he explained his views. He remained at Göttingen until his death, on the 14th of August, 1841.

Herbart is the founder of a particular system of philosophy, which is interesting on account of his peculiar method rather than his originality of thought, for in reality his system is of a syncretic kind, and Fichte's influence upon it cannot be mistaken. (See the article 'Herbart' in the 'Supplement to the Penny Cyclopædia.')

HERBELOT, BARTHE'LEMI D', was born at Paris, December 14, 1625. He commenced the study of the Oriental languages in early life, and acquired an accurate knowledge of the Arabic, Hebrew, Syriac, Persian, and Turkish languages. He was appointed Oriental secretary and interpreter to the King of France, and subsequently professor of Syriac on the death of Auvergne. He also received a pension from the king. He died 8th of December, 1695.

The work by which D'Herbelot is known to posterity is entitled 'Bibliothèque Orientale, ou Dictionnaire Universel, contenant généralement tout ce qui regarde la Connoissance des Peuples de l'Orient,' fol., Paris, 1697. He also wrote several other works, which have never been published. Amongst these a Turkish and Persian Dictionary, in three volumes folio.

HERBERT OF CHERBURY, EDWARD, LORD, was born in the year 1581, at Montgomery, in Wales. After going through the usual course of studies at Oxford, Herbert visited London in 1600, and shortly afterwards proceeded to the Continent, where he joined the English auxiliaries in the Netherlands, and was soon distinguished by reckless daring and intrepidity. Having returned to England, he was, upon the accession of James I., created a knight of the bath, and was distinguished at court by his gallantry and learning. In 1618 Sir Edward was sent ambassador to France: in this situation the bold independence with which he answered a remark of the Connéable De Luynes brought upon him the displeasure of the French monarch, at whose request he was recalled. The conduct of Herbert met however with the approbation of James, who, upon the death of De Luynes, sent him again to Paris, where he published his first work, entitled 'Tractatus de Veritate, prout distinguitur à Revelatione, Verisimili, à Possibili, et à Falso,' 4to., Paris, 624. The year following he returned to England, and was created a baron of the kingdom of Ireland. In 1631 he was elevated to an English peerage, and two years after published an enlarged edition of the 'Tractatus,' of which another appeared in 1645, accompanied with the treatise 'De Religione Gentilium, Errorumque apud eos causis.' Upon the outbreak of the political troubles under Charles I., Lord Herbert at first took the side of the parliament, which however he subsequently abandoned at a great sacrifice of personal interests and fortune. He died in the year 1648. After his death two posthumous works were published, the 'Expeditio Buckinghami Ducis in Ream Insulam,' and the 'Life and Reign of King Henry VIII.,' with a dedication to the first Charles. It is by the latter work that Lord Herbert is best known to posterity. His Memoirs which are the earliest instance of autobiography in our language, remained in manuscript until they were printed, in 1764, by Horace Walpole, at Strawberry Hill.

Herbert of Cherbury was the contemporary of Hobbes of Malmesbury, to whose principles of philosophising he was directly opposed, notwithstanding the striking coincidence of many of the results at which they respectively arrived.

HERBERT, GEORGE, born April 3, 1593, was the fifth brother of Lord Herbert of Cherbury. He was educated at Westminster, and elected thence to Trinity College, Cambridge, about the year 1608. In 1615 he became fellow of the college, and in 1619 was elected public orator. He was made prebendary of Leighton Bromswold, or Layton Ecclesia, in 1626. He married in 1630, and in the same year accepted the rectory of Bemerton. He died in 1632. His poetical works are well and deservedly known. His chief prose work is 'The Priest to the Temple,' a sequel to his work called 'The Temple; Sacred Poems and Private Ejaculations.'

HERBERT, SIR THOMAS, was born at York about 1606, and entered Jesus College, Oxford, in 1621, whence he removed to Trinity College, Cambridge. In 1626 he went abroad in the suite of Sir Dodmore Cotton, ambassador from Charles I. to the Shah of Persia. In 1634 he published his 'Some Yeares Travels into Africa and Asia the Great,' &c. Herbert espoused the cause of the Parliament, and in 1647 was one of the commissioners appointed to receive the king from the Scots at Newcastle. The respectful propriety of his behaviour won the regard of the royal prisoner, towards whom Herbert in his turn appears to have conceived a strong affection. He attended him to the last; and after the Restoration his service was rewarded by Charles II. with the title of baronet. In 1678 he published 'Threnodia Carolina,' an historical account of the last two years of the life of King Charles I., by Sir Thomas Herbert and others, reprinted by Nicol in 1813. He died at York in 1682.

HERCULA'NEUM, or *Herculanum* (Cic. 'Ad Att.,' iii. 7), a very ancient Italian city, situated on the coast of Campania, near Naples. In the time of Titus, A.D. 79, it was overwhelmed by that memorable eruption of Vesuvius which also ruined Pompeii. It appears to have been buried under showers of ashes, subsequently overflowed by streams of lava, and is stated to be 70 feet below the present surface of the ground. It was re-discovered by the sinking of a well in 1713, when several antiquities were found. This led to further investigation; and after several years, in which little was done, the Neapolitan government undertook the work of excavation. The

theatre, a chalcidicum, and two temples are the chief buildings explored: the private houses are chiefly small, and of one story, like those of Pompeii. The whole excavation it said to have been about 600 yards long by 300; but it being impossible to remove the incumbent soil, in consequence of its thickness, as fast as one part was thoroughly searched, it was filled up with rubbish from another. A small part of the theatre is all that is now accessible. The chief advantage as yet derived from Herculaneum is the magnificent collection, not only of statues and paintings, and vases, but of domestic implements of every use and description, deposited in the Royal Museum at Portici. These are figured and described in the magnificent work, 'L'Antichita d'Ercolano,' Nap., 1757, 10 vols. fol. The collection has been abundantly increased from Pompeii.

Great expectations were raised by the discovery of a large number of manuscripts written on rolls of papyrus. The attempts to unroll them hitherto have had but imperfect success; and those of which the subjects have been ascertained are of little interest. There seems to be very little hope of recovering any of the lost treasures of antiquity in this quarter. The work entitled 'Herculanensium Voluminum quæ supersunt,' Naples, 3 vols., 1788, 1809, 1827, contains, we believe, all that has yet been deciphered. The University of Oxford published, in 1824-5, two volumes, 8vo., of fragments lithographed from fac-similes (apographa) presented to them by George IV.; these have been also published in the Neapolitan work. The bulk of those which have been examined contain the works of Greek philosophers and sophists, and treat of natural and moral philosophy, medicine, criticism, the arts, &c. The papyri have uniformly been found in a state resembling charcoal, dry and crumbling, the laminæ, for the most part, strongly adhering to each other.

HE'RCULES (in Greek, Héracles), the offspring of Zeus by Alcména, daughter of Electryon, a son of Perseus, and king of Mycenæ. His reputed father was Amphitryon (son of Alcæus, another of the children of Perseus), who, having accidentally killed his father-in-law Electryon, was compelled to leave Mycenæ and take refuge in Thebes. Here Hercules was born and educated, and here his early feats of strength and valour were done; such as slaying the lion of Cithæron, delivering Thebes from the tribute to Erginus, king of Orchómenos, and taking in marriage the daughter of Creon.

Being fated to serve Eurystheus, king of Mycenæ, he performed what are called his twelve labours, in obedience to the commands of his master. The legends of Hercules perhaps afford a better instance than those of any other hero or god, except Apollo, of the various sources from which mythical accounts spring. Hercules is represented as a half-naked man, with broad shoulders and brawny limbs, resting on a club, and covered round his loins with the skin of the Nemean lion.

HERCULES, one of the old constellations, called *ἐγγόνασιν* by Aratus, Hyginus, and Ptolemy, and described by the first as 'a figure like that of a man in sorrow,' while the second offers various fabular significations from the stories of Hercules, Orpheus, Cetheus, Theseus, Thamyris, Ixion, Prometheus, &c. The club, lion's skin, and character of Hercules are not so old as Aratus, who describes this figure as stretching his hands to different quarters, and makes an allusion to the neighbouring dragon, which shows that he was not painting a hero.

The constellation is situated between Draco, Boötes, Lyra, and Ophiuchus; but, as there is no star in it larger than of the third magnitude, there is nothing very remarkable about it. The principal stars α and β lie between the bright stars in the head of Ophiuchus and in Corona Borealis.

HERCULES, PILLARS OF. [GIBRALTAR.]

HERDER, JOHANN GOTTFRIED VON, was born in 1744, at Morungen in East Prussia, where his father kept a little girls' school. The only books he was allowed to read were a Bible and Hymn-book, though he secretly turned his attention to other works. He gained the acquaintance of persons who appreciated him, and procured him a place as instructor in the Friedrich's College at Königsberg. With the most indefatigable industry he studied philosophy, natural science, history, and languages, and in 1764 became assistant at the cathedral school at Riga, to which office that also of preacher was attached. Though his sermons were greatly admired, he soon left the situation, as he desired to study the world at large. He accordingly went to France, and was there chosen by the Prince of Holstein-Oldenburg as his travelling companion. He would have gone from France to Italy had he not been arrested by a complaint in his eyes at Strassburg, where he first became acquainted with Göthe. In 1775 he became theological professor at Göttingen. He died in 1803.

The writings of Herder fill about sixty volumes and are on the greatest variety of subjects. As a theologian he has gained celebrity by his 'Spirit of Hebrew Poetry;' as a philosopher, as the author of the 'Philosophy of the History of Man.' His collection of popular ballads of all nations has a high reputation.

HERDERITE, a right rhombic prismatic crystal, with a conchoidal fracture, a grayish colour and nearly transparent.

HEREDITAMENT. [DESCENT.]

HEREFORD, an ancient city, and parliamentary and municipal borough, is situated on the left bank of the Wye, 115 miles W.N.W. from London. The city, as a municipal borough, is divided into 3 wards, and is governed by 6 aldermen and 18 councillors: population, in 1841, 10,921. The parliamentary borough returns two members to the House of Commons. Population, 11,367.

In early times this city was important as a garrison to restrain the Welsh. The castle consisted of two wards of different dimensions, having a keep within the smaller: the Wye formed a defence on the south side; on other points it was defended by moats. In 1652, the parliamentary commissioners returned it as 'ruinous,' and the materials worth no more than 85*l*. The princi

events of its history are its pillage by the Welsh in 1055; its capture by King Stephen in 1141; the execution of Owen Tudor, in 1461; the surrender of the city, in 1643, to the parliamentary troops, headed by Sir Wm. Waller; and the siege of Hereford by the Scotch under Lord Leven. In and adjoining the city there were formerly establishments of Gray Friars, Black Friars, and Knights Hospitallers of Jerusalem.

Hereford is situated in a broad, fertile, and well-cultivated valley, and at sufficient elevation above the river Wye to be free from fogs and damp. The principal streets are broad and straight, and have all been macadamised. The private houses, with few exceptions, are built with red brick, and the public buildings of stone. The shire-hall was built after a plan of Sir Robert Smirke, and is remarkable for its unassuming beauty and good arrangement. The town-hall, a large wood and plaster building supported by oaken pillars, stands in the High Town. The union workhouse, opened in 1838, stands just beyond the N.E. limits of the city. The county gaols are in the same neighbourhood. There are several hospitals or almshouses. The principal churches are those of All Saints, St. Peter, St. Nicholas, and St. John. In addition to the churches belonging to the establishment, there are places of worship for the principal denominations of dissenters.

Hereford Cathedral stands upon the south side of the city, not very far from the Wye. The date of the original building is fixed at 825; the whole was rebuilt by Bishop Athelstan about the year 1030. This cathedral was entirely demolished in 1055. No renewal was attempted until the latter years of William the Conqueror's reign, when Bishop Lozing and others commenced the present building. In 1786 the western portion of the cathedral fell, and alterations were made; the spire was removed, and a new western end added by Wyatt. The cathedral contains many monuments of great antiquity, some of which are highly ornamented. For a minute description of this cathedral, see Duncomb's 'History of Herefordshire' and Britton's 'Cathedrals.'

HEREFORDSHIRE is bounded E. by Worcestershire and Gloucestershire; N. by Shropshire, with a portion of Worcestershire; W. by Radnorshire, Brecknockshire, and a part of Monmouthshire; and S. by Monmouthshire and Gloucestershire. The length N. to S. is about 0 miles; the breadth W. to E. 34 miles. The rea is 860 square miles, or 550,400 acres. The opulation in 1841 was 113,878.

Surface, Rivers, &c.—The surface of this unty is generally hilly, but the valleys occaonally expand into open plains. The Hatterel ange of the Black Mountain, which forms its order on the west south-west, is the highest land ithin its limits; there is likewise a third and wer line of hills extending in the same direction om Middlewood to Wormbridge. In the southrest the Saddlebow and Garway are conspicuous; nd in the south the hills near Walford and Penard. The Malvern Hills and the range stretching northward from Stamford Bishop are the principal heights on the eastern boundary. On the north are the hills of Downton and Leintwardine, together with the range running in a south-west direction from Ludlow. Near the centre of the county, Dinmore, Westhope, and Badnage Hills, with the line on which the circle of firs called Lady Lift stands conspicuous, form the most prominent features.

No large rivers have their source in these hills; the principal streams which water Herefordshire rise in the higher counties of South Wales. They are, the Wye, the Lugg, the Teme, the Arrow, the Fromie, the Leddon, the Doyer, and the Munnow.

The *Wye*, which rises in Cardiganshire, enters Herefordshire on its western side, and after many windings reaches the city of Hereford, and finally leaves the county near the Leys. It is imperfectly navigable throughout the whole of this county. The immediate vicinity of mountains, and the very large surface of country which it drains, cause sudden and frequently destructive floods. For picturesque beauty this river is justly celebrated. Trout, grayling, laspring, and salmon are taken. Since the destruction of a weir in the lower part of the river the number of salmon has increased. None of the other rivers are navigable to any useful extent; they are chiefly remarkable for their plentiful supply of fish. Two canals have been formed through portions of this county for the conveyance of coal and other heavy goods. The Newport, Abergavenny, and Hereford line of railway has at present (Jan. 1849) not been completed in any part of Herefordshire.

Climate, Geology, and Agriculture.—The climate of Herefordshire varies greatly, according to the elevation and exposure. The neighbourhood of Ross and Ledbury, as well as the central portion of the county, enjoys a far superior climate to such portions of the north and west as are in the vicinity of Wales.

To the casual observer the whole of Herefordshire appears to consist geologically of old red sandstone, a formation of great thickness. This trough of sandstone is neither frequently broken through by igneous rocks, nor materially lifted or curved by their action. On the eastern side, the general direction of the strata is from N. to S. In the neighbourhood of Eastnor Park three of the grauwacke formations have the north-easterly and south-westerly strike so persistent in Shropshire and Wales, but this is only for 2½ miles. The discrepancy is still greater between the strike of the major axis of the Woolhope Valley, extending to Flaxley in Gloucestershire (a distance of about 18 miles), and that of Shucknell Hill, which, although only two miles distant from the northern end of the Woolhope Valley, and composed of the same rocks, has a direction from south-west to north-east, and at right angles to the former, which runs from north-west to the south-east. The strike of the strata of Shucknell Hill is parallel to the line of bearing of the adjoining trap rocks of Bartestree. On the western boundary the prevailing strike of the deposits is from north-east to south-west; but there are minor axes of elevation, subordinate to the great line of elevatory movement, which are for the most part marked by eruptive ridges of trap rock, which tilt the strata upon their flanks

both to the north-west and to the south-east. Limestone has been raised to the surface in many places; for instance the valley of elevation at Aymestry, at Ledbury, and the foot of the Malvern range. The valley of elevation at Woolhope is supposed to be the most symmetrical in Great Britain. The whole of the valley is stated to be one of clean denudation, being entirely free from any fragments even of the old red sandstone, though the inferior and denuded strata must have been raised up through that formation.

The soil of this county consists principally of a deep and heavy loam, with a substratum of clay in some districts, and gravel in others. The whole is very favourable to the growth of trees, especially the apple-tree and oak. In the neighbourhood of towns the land is cultivated chiefly as meadow or pasture. The high lands are generally occupied by oak coppices, which are numerous and extensive; these are felled at periods of from 16 to 20 years, and fetch a price of from 18*l.* to 20*l.* an acre. In the lower lands, crops are raised in the following succession: wheat, turnips, barley, clover, and peas or vetches. It is to the wheat crop that the farmer pays his chief attention. The last two weeks in October or the first in November, are reckoned the best time for sowing. From the peculiar nature of the soil, and want of good management, the turnip crops are seldom flourishing. Hop-yards are common in the middle and eastern portions of the country. Orchards are numerous, and produce large quantities of cyder.

The county is celebrated for its breed of cattle, which are red, with white or mottled faces, and occasionally white about the legs. Dairy farming is never practised here, and the milk of the cows, which are only kept for breeding, is given to the calves. The oxen are now no longer worked, but are fed at two years old, and sent to market at three. The usual breed of sheep is a cross between the Leicester and the Ryeland. Welsh mutton may be procured at most of the county towns. Agricultural horses of average quality are bred in considerable numbers. The north part of the county produces useful riding and coach horses. Pigs are chiefly procured from Wales, whence a large supply of eggs and poultry are also sent.

Divisions and Towns.—Herefordshire is divided into 11 hundreds. It is in the diocese of Hereford. It is in the Oxford circuit. The assizes are held at Hereford. The county returns 3 members to parliament; the city 2; and the borough of Leominster 2; making 7 in all.

The following are the chief towns, with the population of each in 1841:—

Bromyard is about 16 miles N.E. from Hereford. The town is small and irregularly built, and a considerable proportion of the edifices are of wood. Population, 1217.

Hereford. [HEREFORD.]

Kington is 19 miles N.W. from Hereford. The town is generally well built, and the inhabitants are principally employed in the manufacture of narrow cloth. The town contains a free grammar-school and a charity-school. Population, 2091.

Ledbury is 15 miles E.E.S. from Hereford. The church is a spacious edifice of Norman architecture. The town consists of two principal streets intersecting each other: it contains several alms-houses, and grammar, charity, and national schools. Its trade depends upon the produce of the neighbouring orchards and hop-grounds. The hops, cider, and perry are all of excellent quality. Population of the parish, 4591.

Leominster, a parliamentary and municipal borough, is 13 miles N. from Hereford. It has sent members to parliament since the reign of Edward I., and received its charter of incorporation from Queen Mary, for supporting her cause against Lady Jane Grey. The high street of the town is spacious, but many of the other streets are narrow and inconvenient. The church is of considerable antiquity; it is an irregular building, the work of different periods. There also places of worship for dissenters. The town contains a free grammar-school, and a school on the national plan. The town-hall is a singular structure, of plaster and timber-work, erected in 1663. The municipal borough is governed by 4 aldermen and 12 councillors: population, 3892. The parliamentary borough returns 2 members. Population, 4846.

Ross, a market-town, is about 14 miles S.S.E. from Hereford. The church is a handsome and spacious structure, with a lofty spire, founded by Robert Betun, bishop of Hereford in the 12th century. There are places of worship for dissenters, a union workhouse, charity schools, an alms-house, a dispensary, and other benevolent institutions. The streets are generally narrow and inconvenient, but are receiving many improvements. Population, 2523.

Weobly is 13 miles N.W. from Hereford, and 147 miles from London. The town consists of one principal street, which contains some well-built modern structures. It was formerly a parliamentary borough, but was disfranchised by the Reform Act. Population, 548.

History and Antiquities.—The greater part if not the whole of Herefordshire was comprised in the territory of the Silures, and was conquered by the Roman general Julius Frontinus, about A.D. 73. A line of Roman and British intrenchments may be traced from the Malvern Hills to Whitbourn, Thornbury, Croft, Brandon (near Leintwardine), and Coxwall Knoll (near Brampton Brian). There are also traces of a camp on the east of Leintwardine, near Downton, and several Roman roads in various parts of the county.

During the Heptarchy Herefordshire belonged to Mercia, and in 680 a synod was held at Hereford, which was the principal town of Mercia in the time of Offa.

The position of Herefordshire relative to Wales subjected it to continual inroads from the Welsh. A considerable part of the county was included in the 'Marches,' a term used to express the frontier in dispute between the Welsh and the English. In spite however of repeated defeats of the Welsh and very severe exactions, attacks continued to be made upon the persons and property of the Marchers; but no event occurred which immediately affected this county, until the crown of England was in dispute between Stephen and Maud, the daughter of Henry I. Geoffrey

Talebot and Robert, earl of Gloucester, then declared in favour of the empress. Talebot retired to Hereford, but soon quitted it, and the castle of Weobly, which had been garrisoned against Stephen, was totally demolished. Stephen afterwards invested the city of Hereford, but the result of the siege is not known.

During the troubled times of Edward II. Herefordshire was the scene of many executions. The king's adherents, Hugh de Spencer, Baldoe, and Reding, were executed at Hereford.

No particular event occurred by which this county was locally affected, until the rebellion of Owen Glendwr threw the Marches into confusion. [GLENDWR.]

During the wars of York and Lancaster this county did not escape the general commotion. During the civil wars the city of Hereford was garrisoned for the king, but was taken by Sir William Waller. After the battle of Naseby the king marched to the relief of Hereford, and the Scotch army raised the siege. In the course of the year 1646 the city was taken by surprise, and the whole county was reduced by detachments in the interest of the parliament, under the command of Sir William Waller and Colonel Birch.

There were several castles in Herefordshire, of which a few ruins remain, but most of them have been demolished. The only druidical remains are a pile of stones called Arthur's Stone, situated in the parish of Dorstone.

HERENTHALS. [ANTWERP.]

HERESY, HERETICS. The word 'heresy' (from *αἵρεσις, choice*) was originally used to express any opinion which a man adopted. Thus it was applied to the philosophic sects of Greece and Rome. (Cicero, 'Paradox, Proëm.') In the New Testament the term often simply denotes a religious party, without implying any censure. (Acts, v. 17; xv. 5; xxvi. 5; xxviii. 22.) Josephus calls the three great Jewish sects *heresies*. ('Antiq. Jud.,' xiii. c. 5, s. 9.) But it is also used in the New Testament as a term of reproach. Thus it was applied by the Jews to Christianity (Acts, xxiv. 5, 14), and by the Apostles to those who resisted their doctrines (1 Cor. xi. 9; Gal. v. 20; 2 Pet. ii. 1; Tit. iii. 10). The fathers applied the words *heresy* and *heretics* respectively to opinions which were different from what they considered the doctrine of the Apostles, and to those who held such opinions, though some of the fathers draw a distinction between *heresy*, as a wilful rejection of the doctrines of Scripture, and errors arising from ignorance or weak judgment. When the creed of the church began to be settled by ecclesiastical councils, all who refused to submit to their decisions were denounced as heretics. They were also called *heterodox*, while those who adhered to the opinions of the church were called *orthodox*, or *catholics*. Heretics were distinguished from unbelievers, inasmuch as they professed Christianity. Heresy must not be confounded with schism: the former relates to doctrine; the latter is any division on points of discipline. The number of heresies mentioned by early ecclesiastical writers is from 80 to 150; but Lardner ('Hist. of Heretics,' i. 5) has shown that many of these ought to be excluded from the list; nor have we any evidence that many of them had numerous followers. The most important of the various sects generally included under the term are treated of under their respective names.

Before the Reformation in England heresy was the holding of opinions contrary to the Catholic faith and the determination of Holy Church: at least this is the definition of heresy in the Statute 2 Hen. IV. c. 15. The court in which a man could be convicted of heresy, according to the common law, was that of the archbishop in a provincial synod. After conviction the criminal was delivered up to the king to do what he pleased with him. If the criminal had abjured his heresy and then relapsed, the king in council, upon a second conviction, might issue the writ De Hæretico Comburendo, upon which the criminal was burnt alive. One Sawtre, it is said, was the first man burnt alive for heresy in England, and the writ De Hæretico Comburendo was formed in his case.

The 1 Elizabeth, c. 1, repealed all former statutes about heresy, which was accordingly punished, after the Reformation was fully established, by ecclesiastical censures, and by burning alive a criminal who had been convicted, in the manner above described, in a provincial synod. The writ for burning the heretic could not be demanded as a matter of right, but was left to the discretion of the crown; and both Elizabeth and James I., in their discretion, thought proper to grant the writ. Elizabeth, it is said, burnt alive two Anabaptists, and James burnt alive two Arians.

The Statute of 29 Charles II. c. 9, abolished the writ De Hæretico Comburendo. Heresy is now left entirely to the ecclesiastical courts: and the punishment of death in consequence of any ecclesiastical censure was by that act abolished in England. As Elizabeth and James practically showed their approbation of burning heretics alive, so Lord Coke (3 'Instit.' c. 5) approves of the punishment.

At present the ecclesiastical courts punish for heresy, when they do punish, *pro salute animæ*, as it is termed, that is, solely out of regard to the soul of the offender. But it is difficult to say at present what can be called heresy; and perhaps it is difficult to say what is exactly the punishment for it. Indeed there seems no risk in asserting that much of the jurisdiction of the ecclesiastical courts in respect to heresy, whether it shows itself in speaking, writing, or preaching, has been destroyed by the various Toleration Acts. The Criminal Law Commissioners see no reason for retaining the jurisdiction of the ecclesiastical courts in matters of heresy, 'except so far as it may be directed to prevent ministers of the Established Church from preaching in opposition to the articles and doctrine of the establishment of which they receive their emoluments.' So far as this there is certainly no objection. He who preaches against the church to which he still professes to belong should be turned out of it.

The history of heresy in England is instructive. The change from burning alive to the almost un-

limited expression of opinion on religious matters is one of the steps in the social progress of England.

HERIADES, a genus of hymenopterous insects of the section *Mellifera* (Latreille), and family *Apidæ*. Body elongated, slender, almost cylindrical, that of the males with a small cavity beneath, near the apex; mandibles triangular; maxillary palpi two-jointed.

The little bees belonging to this genus, we are informed by Latreille, make their nests in holes in old trees. We presume that, as in the genus *Chælostoma*, the holes are made by the bees themselves.

The smallest British species of bee belonging to the family *Apidæ* (*Heriades Campanularum*) is very common in many parts of England during the summer and autumnal months; it frequents the flowers of the various species of *Campanulæ*, and is seldom or never found to visit the flowers of any other genus of plants.

HERICOURT. [Saône, Haute.]

HERIOT is a feudal service consisting in a chattel which is given to the lord on the death of a tenant, and in some places upon alienation by a tenant. Heriots are either heriots-custom or heriots-service. A heriot due from the dying tenant by reason of his relation of tenant within a particular manor, or other district, is called *Heriot-custom: Heriot-service* is a heriot due in respect of the estate of the tenant in the particular land held by him.

HERM. [Guernsey.]

HERMANN, the *Arminius* of the Roman historians, was the son of Sigimer, chief of the Cherusci, and was born about 16 B.C. Having been sent in early youth as a hostage to Rome, he obtained the favour of Augustus, and was inscribed among the Roman knights. On his return to his native country, he conceived the project of delivering it from the Romans. He defeated Varus, the Roman governor in Germany, by which the Romans lost all their conquests beyond the Rhine. After a series of successes against the Romans, Hermann remained unmolested in Northern Germany. Shortly after however, he was killed by his own relatives, being accused, as it would seem, of aspiring to absolute dominion. He died at the age of 37, in 21 A.D., after being for twelve years the leader and champion of Germany.

HERMAPHRODITE. [Monster.]

HERMAS, a Christian writer of the first century, who is said by Eusebius ('Hist. Eccl.,' iii. c. 3) and Jerome ('De Illustr. Viris,' c. 10) to have been the same individual whom St. Paul salutes in his Epistle to the Romans (xvi. 14). He was the author of a work entitled 'The Shepherd,' which is frequently quoted with the greatest respect by almost all the early Christian writers. We learn from Eusebius ('Hist. Eccl.,' iii. c. 3, 5) and other writers that it was received by many churches as a canonical work. After the time of Origen, who considered it of divine authority, its canonical authority appears to have been generally denied.

'The Shepherd' contains no express citations of any books of the Old or New Testament. This work was originally written in Greek; but there is only an ancient Latin version of it extant. There is an English translation by Wake, London, 1693 and 1710.

HERMES, an ancient Greek divinity, known to the Romans as *Mercurius*, was, according to Hesiod ('Theog.,' 942), the son of Zeus and Maia, the daughter of Atlas. The attributes of this deity are numerous and of opposite kinds; but it appears probable that he was originally considered to preside over flocks and herds.

In Homer the name of this deity is usually Hermeias. He is represented as the messenger of Zeus and the gods, and he conducts the souls of the departed to Hades. In later times he was regarded as the god of eloquence; the inventor of the lyre and weights and measures; the patron of merchants and of gain, and even of thieving; and the protector of heralds, poets, musicians, and wrestlers. Statues of Hermes, which were originally square blocks with a carved head upon them were placed in the doorways of most private houses and temples at Athens. (Thucyd., vi. 27.) They were also erected where several roads met, to point out the way, and in the gymnasia, or public places of exercise.

Hermes is usually represented with a chlamys, or cloak; a petasus, or winged cap; talaria, or winged sandals; and a caduceus, or wand, with two serpents twined about it, in his hand.

The Egyptian god Thoth was also called Hermes by the Greeks. A great number of philosophical and astrological works, purporting to be written by the Egyptian Hermes, were in circulation in the early ages of the Christian æra. Most of them appear to have been written at Alexandria by Gnostic Christians, or philosophers of the Aristotelian or of the new Platonic schools. A few of these works are still extant.

HERMES, GEORG, the founder of a philosophical school of Roman Catholic theology, was born on the 22nd of April, 1775, at Dreyerwalde, in Westphalia. He became a pupil of the gymnasium at Rheina, and in 1792 entered the theological faculty at Münster. In 1798 he was appointed teacher at the gymnasium of Münster, and all his exertions henceforth were directed towards restoring, on a firm basis, that which had been demolished by Kant's 'Criticism of pure Reason.' In 1807 he was appointed professor of theology at Münster, and in 1819 filled the same office at the University of Bonn. His lectures attracted students not only from all parts of Catholic Germany, but the King of the Netherlands sent a large number of young men to Bonn for the special purpose of studying under Hermes. In the enjoyment of the highest esteem both of his colleagues and pupils, he died at Bonn on the 26th of May, 1831.

The only work that Hermes published bears the title 'Einleitung in die Christ-Katholische Theologie,' Münster, 1819, 8vo.; a second edition appeared in 1831. Soon after the elevation of Droste-Vischering (between whom and Hermes considerable ill-feeling existed) to the archbishopric of Cologne, reports were made to Rome about the infidel tendency of the work of Hermes in which the objectionable point was his principle

that reason or philosophy must in the first place prove the reality of a divine revelation, and in the second, the truth of the Roman Catholic system.

On the 26th of September, 1835, the Pope issued a brief against the work of Hermes, and the consequence was a rupture between the courts of Berlin and Rome, and a long controversy, the best exposition of which may be found in Elvenich's 'Der Hermesianismus und sein Römischer Gegner Perronne,' Breslau, 1844, 8vo.

HERMIAS. [ARISTOTLE.]

HERMIT, more properly *Eremite*, from the Greek ἐρημίτης, signifying an inhabitant of the desert, is the name given to such religious persons as retired from society without becoming members of any monastic community. [ANCHORET; MONACHISM.]

HERMIT-CRAB. [PAGURIANS.]

HERMO'GENES was a native of Tarsus, and lived under Marcus Aurelius. At the age of fifteen, it is said, he was professor of Greek eloquence at Rome, where his lectures were attended by that emperor. At the age of eighteen he wrote his work on the oratorical art, consisting of four sections. His illustrations and quotations are chiefly taken from the 'Orations' of Demosthenes. The work of Hermogenes was held in high esteem, and became a standard book in all Greek schools. It has been repeatedly printed in the Greek text, and Gaspard Laurent published it with a Latin translation and commentaries, 8vo., Geneva, 1614. Hermogenes had joined to his work a book of 'Progymnasmata,' or specimens of oratorical exercises, which Priscianus translated into Latin, the Greek text of which remained inedited till the end of the last century, when it was first published by A. H. L. Heeren, and has since been republished by Veesenmeyer, 8vo., Nürnberg, 1812, and by others.

HERMO'GENES, a heretic of the early church, against whom Tertullian has written a treatise, was most probably a native of Africa, and flourished, according to Basnage and Le Clerc, A.D. 168. We have no account of any of his writings, though it may be inferred from the arguments of his opponents that he was an author. For a further detail of his opinions see Lardner, *Hist. of Heretics*, ch. xviii.

HERNANDIA'CEÆ, a natural order of incomplete exogenous plants. It contains only two genera, *Hernandia* and *Inocarpus*. *Hernandia*, the typical genus of this order, was named after Hernandez, a naturalist sent out to Mexico by Philip II. of Spain. *H. sonora* is a tall erect tree, a native of the various parts of the East and West Indies, and has obtained its name *sonora* from the noise made by the wind in whistling through its persistent involucels. The bark, the seed, and the young leaves of this tree are slightly cathartic. The juice of the leaves is employed as a depilatory. It destroys the hair wherever it is applied, and this without producing pain.

HERNANI. [BASQUE PROVINCES.]

HERNIA from (ἔρνος, *ernos*, a branch), signifies the protrusion of any organ from its natural position in the body; as *hernia cerebri*, *hernia pulmonis*, when the brain or lung protrudes through an aperture in the skull or the chest. But when used alone this term means what is commonly called a *rupture*, that is, the protrusion of any portion of the intestinal canal from the cavity of the abdomen.

Herniæ sometimes form without any evident cause, the intestine being gradually protruded; but more frequently they result from some violent bodily exertion, as lifting heavy weights, excessive coughing or straining; or from sudden jarrings or shocks, as in jumping or falling; or from blows on the abdomen.

The general characters distinguishing a hernia are, a tumour, neither red nor hot, and often not painful, situated at some part of the abdomen, most frequently in or near the groin; largest when the patient stands up, and often disappearing entirely when he lies down; distended by coughing or other violent expiration, and liable to variation in size by exercise or rest, by abstinence or taking food; often producing disorders of the digestive canal, as flatulency, colic, &c. In the cases in which the hernia forms suddenly, as in consequence of a great exertion, the patient feels as if something had given way at the groin or other part of the abdomen, and on putting his hand there he feels a tumour which may vary in size from that of a nut to that of his fist, is elastic, hard, and tense, and soon after the accident becomes painful and tender. In the other class of herniæ the tumour forms almost imperceptibly to the patient, and grows larger regularly but slowly. If a hernia can be returned into the abdomen at pleasure, it is not by itself a dangerous disease; but if it becomes strangulated, that is, if the intestine is so constricted by the parts through which it has passed that its contents cannot pass through it, and its vessels are so much compressed that active inflammation is excited, it constitutes one of the most serious accidents to which the human body is liable. The symptoms indicating strangulation of the intestine are obstinate constipation of the bowels; pain and tenderness of the tumour, and spreading from it over the whole surface of the abdomen; extreme restlessness and languor; nausea and vomiting; a hard, small, and rapid pulse; thirst and coldness of the limbs. If the hernia be not reduced, these symptoms will regularly increase, till mortification of the intestine ensues, and (except in some most rare cases) death rapidly follows.

Several forms of hernia are recognised by surgeons according to the part of the abdomen through which the bowel protrudes. The most common are the Inguinal, Femoral, and Umbilical herniæ.

Whatever be the situation or condition of a hernia, it should be at once, if possible, reduced. The patient should go to bed, and after lying a short time on his back, with his knees raised, the intestine will often of itself recede into the abdomen, especially if it have been frequently protruded; but, if it do not, then it should be worked into its place by means of the hands. If this fail, there are several auxiliary means that may be employed, of which a selection must be

made according to the circumstances of each individual case. The warm bath should be first tried in all cases. The abstraction of blood will be useful, not only by the faintness which it produces being a favourable state for reducing the hernia, but by its relieving the inflammation which always arises when the intestine is strangulated, and by checking it in its fatal progress. If the warm bath and bleeding fail, the patient should be placed between warm blankets to recover from their depressing effects, and no more manual attempts should be made for some time. The next means employed should be the continued application of cold by ice or a rapidly evaporating lotion laid over the tumour. Should this fail, and the symptoms of strangulation be increasing, some surgeons recommend tobacco enema. Great caution is necessary however in employing it, and by many it is not had recourse to at all. If the tobacco enema is used, a last attempt at reduction should be made whilst the patient is under its influence. The operation consists in cutting down upon the strangulated bowel, and carefully enlarging the opening through which it has protruded, so that it may return with facility, and, if this attempt is still unsuccessful, an operation must be resorted to.

When a hernia has been completely reduced, its recurrence must be prevented by the wearing of a truss.

HERO, HEROIC, HEROISM are used, in their common English sense, to denote an unusual, and, as it were, superhuman degree of bravery and virtue. This meaning flows directly from the original Greek word, which denoted (at least in the times subsequent to the Homeric poems) a person intermediate between gods and men, and usually of divine descent on at least one side. Such were worshipped with divine honours by those cities and races of men which claimed them as their founders or ancestors. This divine origin however was not essential: thus Philippus of Crotona, who fell in battle against the Phœnicians and Egestæans, was made a hero for his beauty; a heroum, or shrine, was built on the spot where he was buried, and sacrifices were offered to him. (Herod., v. 47.) At a later age Arátus and Brásidas were worshipped as heroes at Sicyon and Amphípolis; and the Athenians slain at Marathon received similar honours. The Heroic Age, properly so called, appears however to have terminated with the immediate descendants of the Greeks who returned from Troy. In Homer the word hero occurs frequently, but in quite a different sense: it is applied collectively to the whole body of fighters, Argeii, Danai, and Achæi, without reference to individuals of peculiar merit, and indeed often appears to be used for little more than an expletive, when he, or the man, or the soldier, would have done equally well. Indeed the application of the word is not even limited to warriors, but is applied to heralds, wise counsellors, kings, &c.

The promiscuous (or Homeric) use of the word hero disappeared in the age succeeding the Homeric poems. When the Greeks looked back to the warlike legends of the earlier race who had borne the title, the lays, exploits, and persons were called heroic; and from the combined effect of poetical exaggeration, reverence for antiquity, and traditions of national descent, the more modern Greek use of the word arose, carrying with it notions of mythical dignity, and of superiority to the later races of mankind.

HERO, or HERON. There are two of this name, both writers on mechanical subjects. Hero, the Elder, was the pupil of Ctesibius, and lived at Alexandria about B.C. 100. The country of the younger Hero is uncertain, but he is supposed to have lived about A.D. 610.

Hero, the Elder, must have enjoyed great reputation, since he is mentioned, by Gregory Nazianzen, with Euclid and Ptolemæus: but he is now principally known by some fragments of his writings on mechanics, which are to be found in the 'Mathematici Veteres,' Paris, 1693. Hero, the Younger, wrote on Practical Geometry and Military Science.

For lists of the works of both these mathematicians see the 'Penny Cyclopædia,' article 'Hero.'

HEROD (HERO'DES), the name of several Jewish princes.

I. HEROD THE GREAT was the second son of Antipater, by whom he was appointed governor of Galilee at the age of twenty-five. In B.C. 40, when the Parthians invaded Judæa, Herod escaped to Rome, where, by the influence of M. Antonius, he was appointed king of the Jews; but the Roman generals in Syria assisted him so feebly, that it was not till the end of the year 38 B.C. that Jerusalem was taken by Sossius. The commencement of Herod's reign dates from the following year. In the year 38 he had married Mariamne, the grand-daughter of Hyrcanus, hoping to strengthen his power by this match with the Asmonæan family, which was very popular in Judæa. He made Aristobúlus, the brother of Mariamne, high priest, but, shortly after, Aristobulus was secretly put to death by the command of Herod. Cleopatra, queen of Egypt, having been informed of the murder, Herod was summoned to answer the accusation before M. Antonius, whom he pacified by liberal bribes. When setting out to meet Antonius, he had commanded his brother Joseph to put Mariamne to death in case he should be condemned, that she might not fall into the power of Antonius. Finding on his return that Joseph had revealed this order to Mariamne, Herod put him to death. In the war between Octavianus (afterwards the Emperor Augustus) and M. Antonius, Herod favoured Antonius. After the battle of Actium he went to meet Octavianus at Rhodes, by whom he was well received, and confirmed in his kingdom. Before he set out, he had imprisoned Mariamne and her mother Alexandra, commanding their keepers to kill them, if he should be put to death by Octavianus. On his return, Mariamne reproached him with his intentions towards her, which she had again discovered. This led to an estrangement between Herod and his wife, and he finally accused her of adultery. She was condemned and executed. After her death Herod suffered the deepest remorse. His open disregard of the Jewish law in-

creased the hatred of the people towards him. To secure himself against rebellion he fortified Samaria, which he named Sebaste, and built Cæsarea, and other cities and fortresses. In the year 17 B.C. he began to rebuild the temple at Jerusalem. The work was completed in eight years, but the decorations were not finished for many years after. (John, ii. 20.) Herod's power and territories continued to increase, but the latter part of his reign was disturbed by the most violent dissensions in his family. He died in March, B.C. 4, in the thirty-fourth year of his reign and the seventieth of his age.

The birth of Jesus Christ took place in the last year of Herod's reign, four years earlier than the æra from which the common system of chronology dates the years A.D. (Clinton's 'Fasti Hellenici.')

II. HEROD ANTIPAS, son of Herod the Great, was appointed by his father's will tetrach of Galilee and Peræa. About A.D. 26 he divorced the daughter of Aretas, king of Arabia, and married his sister-in-law Herodias. John the Baptist, having remonstrated against this marriage, was imprisoned, and afterwards put to death. (Luke, iii. 19, 20; Mark, vi. 17-29.) About the same time Aretas marched against Antipas and defeated him. In A.D. 39 Antipas was accused by Agrippa, king of Judæa, of a secret understanding with the Parthians, and was banished by Caligula to Lyon.

III. HEROD AGRIPPA, son of Aristobulus and grandson of Herod the Great, after experiencing many vicissitudes in early life, was appointed, upon the accession of Caligula, king of the dominions formerly held by Philip, namely, Gaulanítis, Batanæa, and Trachonítis, to which Caligula added the tetrarchy of Lysanias; and afterwards, when Antipas was banished, the tetrarchy of Galilee and Peræa. Claudius added Judæa and Samaria to his dominions. His government was popular with the Jews, to please whom he persecuted the Christians. (Acts, xii. 1-3.) He died of a loathsome disease at Cæsarea, in the third year of his reign over all Palestine, A.D. 44. (Acts, xii. 20-23.)

IV. HEROD AGRIPPA, son of the above, was seventeen years old at the time of his father's death. Upon the death of Herod, king of Chalcis, four years afterwards, Claudius bestowed that kingdom upon Agrippa. He did not leave Rome till A.D. 53, when Claudius gave him the tetrarchies of Gaulanitis, Batanæa, and Trachonitis. His dominions were enlarged by Nero. It was in A.D. 60 that the trial of Paul before Agrippa took place. (Acts, xxvi.) Agrippa exerted himself to keep down the spirit of revolt among the Jews. When war broke out, Agrippa joined the Romans. After the taking of Jerusalem, he retired with his sister Berenice to Rome, where he died at the age of about seventy years.

(Josephus, *Antiquities of the Jews*, and *Jewish War*; Jahn's *Hebrew Commonwealth*; Prideaux's *Connection*.)

HERO'DES, TIBE'RIUS CLA'UDIUS ATTICUS, a native of Marathon, in Attica, and of an illustrious family, was born under the reign of Trajan. He inherited from his father a very large property. Herodes was educated by the best teachers of his time; and he became an accomplished scholar, rhetorician, and philosopher. Having removed to Rome, his wealth, his connections, and his extemporary eloquence, which is spoken of as wonderful, gave him great importance, and he was made consul with C. Bellicius Torquatus, A.D. 143. Herodes married, at Rome, Annia Regilla, of an illustrious and wealthy family. She bore him four children, and died while pregnant of the fifth. His brother-in-law suspected Herodes, who was of a violent and jealous temper, of foul treatment of his wife, and he brought him to trial on the charge of murder; but Herodes was acquitted. Herodes displayed an excessive grief for the loss of his wife, and he dedicated her estate to Minerva and Némesis. An inscription, which he wrote, or caused to be written, in Greek hexameters, records the fact. There is another inscription, likewise in Greek verse, in which the poet invites the Roman women to honour the memory of Regilla, descanting upon her beauty, virtue, and high lineage. These two inscriptions, which are on two large slabs of Greek marble, have given much employment to critics. (Visconti, 'Iscrizioni Tropee ora Borghesiane,' 4to., Rome 1794.) Herodes died at Marathon, in the 76th year of his age, towards the end of the reign of Aurelius, or the beginning of that of Commodus. He erected monuments, temples, baths, and aqueducts, in Italy, Greece, and Asia. Pausanias (vii. 20) mentions an Odeon, or Music Theatre, at Athens, as built by him, called the Theatre of Regilla, after his wife: he also embellished the Stadium near the Ilissus, which was originally constructed by the orator Lycurgus 350 B.C.

HERO'DIANS (Ἡρωδιανοί, Matt. xxii. 16; Mark, iii. 6; xii. 13; see also Mark, viii. 15), were in all probability a political party in Judæa, who were anxious to preserve the government in the hands of Herod's family. Many critics consider the Herodians to have been a religious sect. In their religious opinions they probably belonged to the sect of the Sadducees; since that which is called by Mark (viii. 15) 'the leaven of Herod' is styled by Matthew (xvi. 6) 'the leaven of the Sadducees.'

HERODIA'NUS, a Greek author, who wrote a history, in eight books, of the Roman emperors who reigned successively in his lifetime, beginning with the death of Marcus Aurelius, A.D. 180, and ending with the accession of the younger Gordianus, A.D. 238. This history comprehends a period of little more than half a century, within which lived the emperors Commodus, Pertinax, Julianus, Niger and Albinus, Septimius Sevérus, Caracalla and Geta, Macrinus, Elagabálus, Alexander Severus, Maximinus, the two Gordiani, and Balbinus. The style of Herodianus is plain, and his narrative in general seems written in a fair spirit. He is the last of the Greek historians of antiquity who lived before the partition of the Roman empire. Among the editions of his history that of Irmisch, in 5 vols. 8vo., Leipzig, 1798-1805, in Greek and Latin, contains numerous notes, chro-

nological and genealogical tables, and several copious indexes. The last edition and the best text is by Bekker, Berlin, 1826, 8vo. There are several German translations of Herodian.

HERODOTUS, a native of Halicarnassus, a Dorian city in Caria, was born about B.C. 484. If the passages in his own History (i. 130; iii. 15) were written by himself, he was probably alive in B.C. 408. He was the son of Lyxus and Dryo, and of an illustrious family in his native state. Not liking the government of Lygdamis, who was tyrant of Halicarnassus, he retired for a time to Samos, where he is said to have cultivated the Ionic dialect of the Greek, which was the language of that island. Before he was thirty years of age he joined in an attempt, which proved successful, to expel Lygdamis. Herodotus again left his native country, and joined, as it is said, a colony which the Athenians sent to Thurii, in South Italy (B.C. 443). He is said to have died at Thurii, and was buried in the Agora, or Public Place. Herodotus was a traveller and observer, as well as an historian. The extent of his travels may be ascertained pretty clearly from his History. The story of his reading his work at the Olympic games, which has found its way into most modern narratives, has been well discussed by Dahlmann, and we may perhaps say disproved. ('Aus seinem Buche sein Leben,' Altona.)

Herodotus makes no display of the great extent of his travels. He frequently does not say that he was at a place, but he uses words which are as conclusive as any statement. He describes a thing as standing behind the door (ii. 182), or on the right hand as you enter a temple (i. 51); or he was told something by a person in a particular place (ii. 28); or he uses other words equally significant. In Africa he visited Egypt, from the coast of the Mediterranean to Elephantine, the southern extremity of the country (ii. 29); and he travelled westward at least as far as Cyréne (ii. 32, 181). In Asia he visited Tyre, Babylon, Ecbátana (i. 98), and probably Susa (v. 52–54; vi. 119). He also visited various parts of Asia Minor, and probably went as far as Colchis (ii. 104). In Europe he visited a large part of the country along the Black Sea, between the mouths of the Danube and the Crimea, and went some distance into the interior. He seems to have examined the line of the march of Xerxes from the Hellespont into Attica, and certainly had seen numerous places on this route. He was well acquainted with Athens (i. 98; v. 77, &c.), Delphi, Dodóna, Olympia (ix. 81), Tegea (i. 66), Thasos, Delos, Zacynthus (iv. 195), and numerous other places in Greece. That he had visited some parts of South Italy is clear from his work (iv. 99; v. 44. 45). The mention of these places is sufficient to show that he must have seen many more.

The Nine Books of Herodotus contain a great variety of matter, the unity of which is not perceived till the whole work has been thoroughly examined. But the subject of his History was conceived by the author both clearly and comprehensively. 'The object of the inquiries (for so we may render the word *ἱστορίη*) of Herodotus of Halicarnassus is this, that the acts of man may not be forgotten through lapse of time, and that great and wondrous achievements, performed partly by Greeks and partly by Barbarians, may not be without their fame; and also how it came to pass that Greeks and Barbarians waged war together' (i. 1). His object then was to combine a general history of the Greeks and the Barbarians (that is, those not Greeks) with the history of the wars of the Greeks and Persians. Accordingly, in execution of his main subject, he traces the course of events from the time when the Lydian kingdom of Crœsus fell before the arms (B.C. 546) of Cyrus, the founder of the Persian monarchy, to the capture of Sestos (B.C. 478) an event which crowned the triumph of the Greeks over the Persians.

The great subject of his work, which is comprised within the space of sixty-eight years, not more than the ordinary term of human life, advances with a regular progress and truly dramatic development, from the first weak and divided efforts of the Greeks to resist Asiatic numbers, to their union as a nation, and their final triumph in the memorable fights of Thermópylæ, Sálamis, and Platæa. But with this subject, which has a complete unity well maintained from its commencement to its close, the author has interwoven, conformably to his general purpose, and by way of occasional digression, sketches of the various peoples and countries that he had visited in his widely extended travels. His predecessors in historical composition appear generally to have chosen subjects of a limited nature, partaking chiefly of the character of local annals. Herodotus chose for his subject a series of events which concerned the universal Greek nation, and not them only, but the whole civilised world; and by the way in which he executed his great undertaking he has earned the honourable and well-merited appellation of the Father of History.

The style of Herodotus is simple, pleasing, and generally perspicuous; often highly poetical both in expression and in sentiment. But it bears evident marks of belonging to a period when prose composition had not yet become a subject of art. His sentences are often ill-constructed and hang loosely together; but his clear comprehension of his own meaning, and the sterling worth of his matter, have saved him from the reproach of diffuseness and incoherence.

There is no translation of Herodotus which has yet done justice to the original, and no commentary has yet exhausted one-tenth of the matter which admits and requires illustration.

The first edition of Herodotus was the Latin translation of L. Valla, Venice, 1474, folio. The most complete edition of Herodotus is by J. Schweighäuser, Strassburg, 1816, 6 vols. 8vo. 'The Apology of Herodotus,' by H. Stephens, prefixed to his corrected edition of Valla's translation, Frankfort, 1595, is a clever and amusing vindication of Herodotus against the charge of falsehood, made on the ground that many of his stories were so singular and improbable. L'Archer's French translation, Paris, 9 vols. 8vo., with the Commentary, is a useful book. There

are various English translations. That by Beloe is as bad as a translation can be.

HEROIC VERSE in its ancient sense means that which was the vehicle of Greek and subsequently of Latin epic poetry, of which the actions of the heroes were the appropriate subject. In English our common ten-syllable couplet passes under this name, chiefly, it should seem, because it is the measure into which the epics of antiquity have been most frequently translated. The Alexandrine of twelve syllables however has been also used by our elder writers for this purpose, as by Chapman in his translation of the 'Iliad.'

HERONS. Under the head of *Echassiers* (*Grallatores*), Cuvier distinguishes the following groups, or, as he terms them, families, viz. the *Brevipennes*, the *Pressirostres*, the *Cultirostres*, the *Longirostres*, and the *Macrodactyles*.

The *Cultirostres* include the Cranes, the Boatbills, the Herons, the Storks, the Jabirus, the Ombrettes, the Tantali, the Openbeaks, and the Spoonbills.

Mr. Vigors considers that the Grallatores are naturally divided into the following five familes: *Gruidæ*, *Ardeidæ*, *Scolopacidæ*, *Rallidæ*, and *Charadriadæ*, an arrangement which is adopted by Mr. Selby, and many other ornithologists.

For other views relative to the arrangement of the Grallatores, we may refer the student to Willughby, Ray, Latham, Duméril, Illiger, Vieillot, De Blainville, Swainson, the Prince of Canino, and other zoologists.

Under this title of *Herons*, it is our purpose to treat of the true Herons, the Spoonbills, the Storks, and the Cranes.

Herons.

Bill long, stout at the base, and sharp pointed; gape extending beneath the eyes; a little nasal fossa prolonged into a furrow extending almost to the point of the upper mandible; lores naked. The internal edge of the middle toe pectinated. Tarsi very long, scutellated in front, reticulated posteriorly. Neck elongated. The stomach is capacious, and capable of considerable distension. The food of these birds consists of fish, reptiles, and such small mammalia as shrews, water rats, &c. Some, as the Common Heron, are gregarious during the breeding season, and build in lofty trees; others are altogether solitary. All are recluse, frequenting wide marshes, and the banks of rivers, which supply them with food. Geographical range universal.

As examples we may mention the Common Heron (*Ardea cinerea*), the Crested Purple Heron (*Ardea purpurea*), the Great White Heron (*Ardea alba*), the Little Egret Heron (*Ardea gazetta*), the Buff-backed Heron (*Ardea [illegible]*), the Squacco Heron (*[illegible]*), the Bittern (*Botaurus stellaris*), and the Night Heron (*Nycticorax Europæus*), all claiming to be regarded as British Birds.

The Common Heron is, in the opinion of Belon and some others, the '[illegible]' of Aristotle, but we do not consider this as certain. But the bird is, without doubt, the *Ardea* of the Romans, and is the *Bacapesce* [illegible] and *Garza*, of the modern Italians; *Garza*, of the Spaniards; *Reyger* and *Rheier* of the Germans; *Héron* of the French; and *Common Heron*, or *Heronshaw*, of the British.

Common Heron (*Ardea cinerea*).

This species is too generally well known to need a detailed description. Its habits are described at large in Selby's 'Illustrations of British Ornithology,' in Bewick's 'Birds,' in Gould's 'Birds of Europe,' and in Yarrell's 'British Birds.' (See also Latham, Pennant, Temminck, and others.)

In the days of falconry the heron was greatly valued, and the destruction of its eggs was visited with a penalty of twenty shillings; moreover it held as high a place at the tables of the great as it did in the field. Its flesh is now disregarded, though according to Mr. Selby it is far from being despicable.

Spoonbills.

In this group the bill is very singularly formed, being spatulate at the extremity. These birds are all included under one generic head, *Platalea*.

Generic Character.—Bill very long, strong, very much flattened, point dilated and rounded into the form of a spoon or spatula; upper mandible channelled, transversely furrowed at its base. Nostrils at the surface of the bill approximated, oblong, open, bordered by a membrane. Face and head partially or entirely naked. Tarsi long, strong; three toes anteriorly united up to the second joint by membranes or webs, posterior toe touching the ground. Wings moderate, ample; the first quill nearly as long as the second, which is the longest.

Habits of the Genus.—The Spoonbills live in society in wooded marshes, generally not far from the mouths of rivers, and are rarely seen on the sea-shore. Their food consists of small fishes, spawn, and small fluviatile testaceous mollusks, as well as small reptiles and aquatic insects. According to circumstances, they build their nests either in high trees, in bushes, or among rushes. [illegible] ordinary, but the young bird does not take the confirmed livery of the adult till the third year; the bill is gradually developed, and at first covered with a membrane.

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The crest makes its appearance at the second year. The sexes have external distinctions, but the characters are but slightly marked. (Temminck.)

We select as an example the Common White Spoonbill, *Platalea leucorodia*, Linn.

Spoonbill (*Platalea leucorodia*).

This species is, there can be little doubt, the λευκερωδίος (Leucerodius) of Aristotle ('Hist. Anim.,' book viii. c. 3). It is the *Becquaroueglia* (Belon) and *Cucchiarone* (Bonaparte) of the Italians; *Pale, Poche, Cueiller, Truble* (Belon), and *Spatule* of the French; *Weisser Laffler* and *Laffel Gans* of the Germans; and *Spoonbill* and *White Spoonbill* of the British.

This bird is a rare visitant to the marshes of our island, but is common in many parts of the adjacent continent, and nowhere more so than in Holland, arriving there as a summer resident, and departing southwards, often with the stork, in autumn.

In this bird, and probably other species, the trachea makes a double flexure before entering the thorax, in which peculiarity it evinces an analogy to the Cranes.

The eggs of the Common White Spoonbill are three or four in number, generally white, but sometimes marked with spots of reddish brown. The nest is made either in trees or among rushes or reeds. (Selby; Gould, 'Birds of Europe;' Yarrell's 'British Birds,' &c.)

Storks.

The Storks are included by most naturalists under one generic head, *Ciconia*. Linnæus, Cuvier, and others separate from this the genus *Mycteria*, distinguished by the somewhat upward flexure of the long and powerful beak; these are *Les Jabirus* of Cuvier.

There can be no hesitation as to the propriety of placing the huge *Marabous*, distinguished by their naked neck and head, and by a sort of naked presternal pouch, in a distinct genus, to which the name of *Leptoptilos* has been given, and we regard the genera *Scopus*, Brisson (*Les Ombrettes*, Cuv.), and *Anastomus*, Illiger (*Les Becs-ouverts*, Cuv.), as well established. Hence the generic characters of *Ciconia* will refer only to a limited number of species, of which the White Stork may be regarded as the type.

Genus *Ciconia*.—*Generic Character*.—Bill long, straight, subcylindrical, in form of an elongated cone, pointed, trenchant. Nostrils slit longitudinally in the horny substance of the bill, placed near the base. Eyes surrounded with a naked space, which does not communicate with the bill; the face, the space round the eyes, or a part of the neck, often naked. Tarsi long; three toes forward, united by a membrane up to the first joint, the posterior toe articulated on the same level with the others; nails short, depressed, without dentilations. Wings moderate; the first quill shorter than the second, which is rather shorter than the third, fourth, and fifth, which are the longest. (Temminck.)

M. Temminck observes that the Storks live in marshes, and feed principally on reptiles, frogs and their spawn, as well as fishes, small mammiferous animals, and young birds. They are, in all the countries of the world where they occur, a privileged race, on account of their utility and of the havoc they make among noxious animals. Their migration takes place in great flocks. They are easily tamed. The moult is autumnal. The sexes do not differ. All the species make a clattering noise with their bills.

The species best known are the White Stork, *Ciconia alba*, and the Black Stork, *Ciconia nigra*.

The White or Common Stork is the Πελαργός of Aristotle and the Greeks; *Ciconia* of the Romans; *Cicogna, Cicogna Bianca* and *Zigognia* of the Italians; *Cicogne* and *Cigogne Blanche* of the French; and *Weisser Storch* of the Germans.

White Stork (*Cicogna alba*).

Assured by the kindness with which it is treated in requital for its services in clearing the land of dead as well as living nuisances, the White Stork approaches the dwellings of man without fear. In Holland and Germany especially the bird is treated as a welcome guest, and there, as indeed elsewhere, it annually returns to the nest which

has cradled many generations, on the steeple, on the turret, on the false chimney that the Hollander has erected for its site, in the box, or on the platform which the German has placed for its use. The stump of a decayed tree is sometimes chosen by the bird, and the nest is made of sticks and twigs, on which are laid from three to five cream-coloured or yellowish white eggs, about the size of those of a goose. The incubation continues for a month, at the expiration of which period the young are hatched and carefully attended to by the parents until they are fully feathered and able to procure food for themselves. In the continental towns domesticated Storks which have been taken from the nest when young may be often seen parading about the markets, where they are kept as scavengers to clear the place of the entrails of fish and other offal, which they do to the satisfaction of their employers.

Geographical Distribution.—The arrival of the Stork in Europe takes place in the spring. In Seville it is very common; but, according to the Prince of Musignano, it is very rare and only an accidental visitor near Rome. Though so common in Holland, it very rarely arrives in Britain; nevertheless it regularly visits Sweden and the north of Russia, and breeds there. The winter is passed by the bird in the more genial climates of Asia, and in the northern part of Africa, Egypt especially. Those who have seen these birds in the act of migration speak of their numbers as very large; Belon also remarks, that the Storks are never seen in flocks, except when they are in the air; and he relates how, being at Abydos, in the month of August, a great flight of Storks came from the north, and when they reached the commencement of the Mediterranean Sea they there made many circuitous turns, and then dispersed into smaller companies. When Dr. Shaw was journeying over Mount Carmel, he saw the annual migration of those which had quitted Egypt; and he states that each of the flocks was half a mile in breadth, and occupied three hours in passing over.

We may now glance at those foreign species of great size and uncouth aspect, termed Marabous, Adjutants, Adjutant-Cranes, or Gigantic Storks, *Les Cigognes à Col Nud*, and from under whose tail the light and valuable plumes called Marabou feathers are procured. We have already alluded to these birds, so remarkable for stature, the enormous volume of their long beak, the nakedness of the head and neck, and the inflateable pendent sac hanging over the upper parts of the chest.

Of these birds three species are known, one from Africa (*Ciconia Marabou*, Vigors), one from India (*Ciconia Argala*, Vig.), and one from Java and the adjacent islands, described by Dr. Horsfield, in the 13th vol. of the 'Linnæan Transactions,' and afterwards by Temminck (*Planches Coloriées*). Temminck however committed an error in calling the African bird *Argala*, and the Indian bird by the Senegal name of *Marabou*, having been induced, we believe, to make this transfer in consequence of the superiority of the plumes derived from the Indian species. The consequence of this perversion of native names has been such as might have been expected.

Thus in the last edition of his 'Règne Animal,' M. Cuvier quotes the *Ciconia Marabou* of Temminck, with the characters of the Indian bird, as a native of Senegal; while he states the *Ciconia Argala* of the same author, to which he attributes the characters of the African species, to be brought from India. Nothing could more strongly evince the necessity of restoring, as Mr. Vigors had previously done, in the Appendix to Major Denham's 'Travels in Africa,' the name of *Argala* to the Indian species, and that of *Marabou* to the African species. For an account of the habits of these birds, see ADJUTANT.

CRANES.

We now come to a group which feed much more on vegetable matters than do any of those which we have previously noticed: there is therefore, as might be expected, a conformable change in the structure of the bill and stomach. The Cranes constitute the family *Gruidæ* of Mr. Vigors, and are divided into several genera.

Genus *Grus*, Pallas. *Generic Character.*—Bill of the length of the head or rather longer, strong, straight, compressed, the point in the form of an elongated cone, obtuse towards the end; lateral base of the mandible deeply channelled; base of the bill elevated. Nostrils in the middle of the bill pierced through and through in the groove, and closed backwards by a membrane. Region of the eyes and base of the bill often naked, or covered with warty excrescences (mamelons). Feet long and strong, a large naked space above the knee; three anterior toes, the middle one united to the external by a rudiment of a membrane; interior toe divided, posterior toe articulated higher on the tarsus. Wings moderate; first quill shorter than the second, which last is nearly as long as the third, and that is the longest; secondaries nearest to the body arched, or very long and subulate in some foreign species.

In the greater part of the species the trachea of the male forms circumvolutions upon itself; in the other species similar sinuosities occur in both sexes, which do not differ in external appearance. Moult once in the year. (Temminck.)

Example, *Grus cinerea.*

This is the Γέρανος (Geranus) of the Greeks; *Grus* of the Romans; *Grue* and *Grua* of the Italians; *Grue* of the French; *Grulla* of the Spanish; *Granich* and *Aschgrauer Granich* of the Germans; and *Crane* and *Common Crane* of the British.

The Crane is migratory and gregarious. Mr. Selby has remarked that in its contour and gait it bears a considerable resemblance to some of the *Struthionidæ*, and that we are reminded of the ostrich by the long flowing plumes that overhang the tail. He is of opinion that through this and other families its affinity to the rasorial birds is readily traced; and he observes that in its internal conformation it differs very essentially from the more typical families of the *Grallatores*, and that its strong and muscular stomach indicates a different general economy from that of the *Ardeidæ*. This is quite true; but whilst the Crane frequents open and cultivated lands, for the sake

of the newly sown corn and seeds to be found in such tracts, it is far from averse to small testaceous

Common Crane (*Grus cinerea*).

molluskes, worms, frogs, and other reptiles. Temminck says that the nest is placed among the rushes, &c., and sometimes on the walls of isolated houses. The pale blueish green eggs, marked with brown, are two in number.

Geographical Distribution.—Temminck states that this crane inhabits the marshy plains of the oriental countries; that it is common in the north, migrates regularly in spring and autumn, is rare in its passage in Holland, and only in very severe winters. Asia is one of the tracts of country much frequented by it. Dr. Von Siebold notices it in his list of birds killed at Japan. Mr. Selby states that its equatorial migrations extend to India, Egypt, and other warm parts of Asia and Africa, but that it retires in summer to the northern and eastern parts of Europe to breed. The migrations are performed high in the air, and the progress of the flock may be traced by the loud cries of the birds when they are beyond the reach of sight. The night-time is frequently chosen for these changes of locality. The Prince of Musignano notes it as very rare and accidental near Rome; Willughby however saw many of them in the poulterers' shops in winter. But it is in England that the alteration of the country, by drainage and inclosure, has caused perhaps the most remarkable absence of these fine birds. They were numerous in the time of our ancestors, and highly esteemed by them, both as objects of sport and as furnishing a dish fit for the table of princes.

Description.—General plumage ashy gray; throat, front of the neck, and occiput very deep blackish gray. Forehead and space between the eye and the bill furnished with black hairs; top of the head naked and red. Some of the secondaries arched, longer, and loose-barbed. Bill greenish black, horn-coloured towards the point,

and reddish at the base; iris red brown. Feet black. Length from the bill to the end of the tail, 3 feet 8 or 10 inches. The old birds have a large whitish space behind the eyes and along the lateral part of the upper portion of the neck.

Genus *Anthropoïdes*, Vieillot. In this genus are included the beautiful Demoiselle Cranes so conspicuous for the elegance of their actions.

The Demoiselle (*Anthropoïdes Virgo*, *Ardea Virgo* of Linnæus) is about 3 feet 6 inches high, measured to the top of the head: from the point of the bill to the tip of the tail it is about 3 feet in length. Upper part of the head light gray; sides of the head, neck, and depending breast feathers, blackish; head and neck fully feathered. A tuft of pure white loose-barbed feathers, 3 or 4 inches long, directed backwards with a curvature downwards behind each eye. General tint slaty-gray; outer portions of all the quill-feathers dingy black. Secondaries longer than the primaries, forming, when the wings are folded, dependent downward-curved plumes. Bill yellowish or flesh-coloured; iris reddish brown.

The Stanley Crane, *Anthropoïdes Stanleyanus* (so named by Mr. Vigors in honour of the Earl of Derby, then Lord Stanley, President of the Zoological Society of London), *Anthropoïdes Paradisæus* of Bechstein, is in its general plumage blueish gray, the top of the tumid head, which is well covered with soft feathers, is whitish, and there is a brownish postocular band; the irides are chestnut-black, and the points of the quills, tail, &c., are brownish black. Length from the tip of the bill to the end of the tail, 3 feet 6 inches. 'In manners and gestures,' says Mr. Vigors, 'the *Anthropoïdes Stanleyanus* appears to conform most intimately with the Demoiselle, displaying the same delicacy and elegance of attitude, and the same majesty, together with the same graceful playfulness in all its movements. I once had the good fortune to see it when released from the place of its confinement, and set at liberty into an adjoining yard; and it was scarcely possible to witness a scene of more grace and animation. The bird, when after a few movements it felt itself free, bounded into the air, and traversed the yard with singular velocity, and a peculiarity of motion which could neither be termed running nor flying; with its wings expanded, and its long quill-feathers streaming just above the ground, it sailed and swept along the open space, without regard to the numerous spectators who watched its movements, luxuriating in all the buoyancy and excursiveness of new-felt liberty. I understand it that is particularly eager in its pursuit after insects, which it takes when they are upon the wing; and that they seem to be its natural and most acceptable food. We may readily conceive what myriads of winged creatures it would encircle within its wings as it swept along its native marshes, in the manner observed above, and which it would thus bring within the compass of its prey.' ('Zool. Journ.,' vol. ii.)

Locality.—East Indies.

Genus *Balearica*, Gray ('Proceeds. Zool. Soc.,' 1833). Allied to *Anthropoïdes*, but differing in the oval form of the nostrils, and in having on the

top of the head an erect spreading crest, consisting of setaceous feathers. Two species are known: 1, the Balearic Crowned Crane (*Balearica pavonina*), a native of Northern Africa; and, 2, the Kaffir Crowned Crane (*Balearica Regulorum*), from South Africa. This latter is the *Grus Regulorum* of Lichtenstein, and differs from the former in the far larger size of the wattle. With respect to the habits of these birds, they are presumed to be migratory; but little is known of them, except in captivity, to which the birds are easily reconciled, living in friendship with the domestic poultry, and other captives, and even, as we have heard, interfering to prevent disputes. In a state of nature they are said to frequent swampy places, and to subsist partly upon fishes, worms, and insects, and partly on vegetable substances. They run with the wings expanded, and with great rapidity. Their note is loud, trumpet-like, and hoarse. In the catalogue of the African Museum (which was sold off in 1838) one of the species, there called the Kaffir Crane, is said to be held sacred by the Kaffirs bordering upon the Cape Colony; and if one should happen to be killed, even by accident, a calf or young cow must be slaughtered as an atonement. Mr. Swainson ('Classification of Birds') notices specimens of *Ardea pavonina*, Linn., as having been brought to him when in Malta, from the little island of Lampedosa, where, he says, they are by no means scarce.

To the *Gruidæ* are referrible the genera *Psophiæ* [Agami], and *Dicholophus* [Çariama], and perhaps *Palamedea*.

HEROPHILUS, a native of Chalcédon, was one of the most celebrated physicians of the Alexandrine school, and lived in the reign of the first Ptolemæus of Egypt. Of his works, which appear to have been very voluminous, nothing now remains except the extracts made from them by Galen and Cœlius Aurelianus, in which they are so interwoven with those of his contemporary Erasistratus, that it is impossible to say what portion of the progress which medicine made in their time was owing to the labours of each.

The chief feature which marks the time of Herophilus in the history of medicine is the commencement of the study of anatomy from dissections of the human body, for which purpose the bodies of all malefactors were appropriated by the government. With such zeal did Herophilus pursue this science, that he is said to have dissected 700 subjects, and it was against him and Erasistratus that the very improbable charge was first made of having frequently opened living criminals that they might discover the secret springs of life. (Celsus, 'Præfat.')

By the labours of Herophilus and Erasistratus nearly every part of the anatomy of the human body was rendered clearer, and many most important discoveries were made.

Herophilus practised surgery as well as medicine, but it is probable that very soon after his time the division of surgery and medicine into distinct professions took place. Of his knowledge of medical practice there is not sufficient evidence in the extracts which Galen makes from his works to enable us to form an accurate idea, and his fame must rest rather on the indirect assistance which he afforded by his anatomical researches, than on any immediate addition to the means of curing disease. He does not appear to have drawn many pathological conclusions from his knowledge of the healthy structure; but his observations on the pulse, of which his master Praxagoras had taught him some of the value as a means of discriminating diseases, were important and interesting; and it was he who first showed that paralysis is the result not of a vitiated state of the humours, as was previously imagined, but of an affection of the nervous system. Herophilus seems to have founded a school which took its name from him. According to Strabo (xii. p. 580) there was a great school (διδασκαλεῖον) of Herophilists in his time established in a temple between Laodiceia and Carura in Phrygia.

HERPES. The word herpes was employed in a very vague sense, and applied to many eruptions of different kinds, until restricted by Willan to a well-defined affection of the skin, characterised by the eruption of clusters of transparent globular vesicles, situated on a red and inflamed base extending some lines beyond them. The vesicles of each cluster commonly vary in size from a millet-seed to a very small pea; the clusters themselves are distinct, being separated by portions of perfectly healthy skin, and they generally rise in quick succession.

The eruption is preceded and accompanied by a degree of constitutional disturbance which generally varies with the extent of the local affection, being often slight and attracting no notice, when this is limited and consists of a few clusters only, but very great and marked by a high degree of fever, when the clusters are numerous and spread over an extensive surface in a young and plethoric subject.

The clusters of vesicles, though they retain in all cases the same characters, and follow nearly the same march, are sometimes confined to a particular locality, justifying the designation, *H. labialis*, *H. præputialis*, or assume a particular arrangement, giving rise to the varieties, *Herpes zoster*, when they are situated on one-half of the body and extend in a line or band; *H. phlyctenodes*, when they are disseminated, and *H. circinnatus*, when they occur in circles or rings.

In *H. labialis* the clusters are disposed irregularly about the mouth, generally on the external surface of the lips. It is always a slight affection in itself, requiring no treatment beyond that of the disorder which it accompanies. *Herpes præputialis* soon heals under the influence of cleanliness, the local application of the lead lotion, and the administration of a few alteratives. In *Herpes zoster*, familiarly known by the name of Shingles, there is a succession of clusters of white silvery vesicles, forming an oblique line or band, limited to one-half of the body, and almost always occurring on the trunk. It is unattended with danger, excepting in old persons, where the clusters are occasionally followed by gangrenous and sloughy sores. In young and plethoric subjects the treatment should consist of bleeding,

saline purgatives, diet, and the application to the part of a sedative lotion. In *Herpes phlyctenodes* the clusters are disseminated, and have no particular seat. It is often met with in children during dentition. In *Herpes circinnatus*, or Herpetic Ringworm, the eruption is limited in extent, frequently of a circular form, and consists of extremely minute vesicles, which dry up and terminate in exfoliation, leaving a scurfy areola. It disappears under the influence of the local application of almost any astringent solution.

HERPETOLOGY, that branch of science which treats of the organisation, natural history, and arrangement of reptiles. The term, literally construed, means a discourse upon reptiles, from 'Ερπετόν (Herpeton) a reptile, and Λόγος (Logos) a discourse. [Reptiles.]

HERRERA, ANTONIO, Coronista mayor de las Indias y Castilla, born at Cuellar, 1549, died at Madrid on the 19th March, 1625. His great work bears the title of 'Historia General de los Hechos de los Castellanos en las Islas y Tierra Firma del Mar Oceano, en 8 decadas,' 4 vols. fol., Madrid, 1601. A highly improved edition, with corrections and additions, is entitled 'Descripcion de las Indias Occidentales,' 4 vols. fol., Madrid, 1730. The rarest perhaps of several other politico-historical works of Herrera is entitled 'Historia de lo Sucedido en Escocia y Inglaterra en 44 años que vivió Maria Estuarda,' 8vo., Madrid, 1589, and 8vo., Lisbon, 1590.

HERRERA, FERNANDO, a native of Seville, lived in the sixteenth century, the golden age of Spanish poetry, among the reformers of which he was prominent. He won the admiration of his contemporaries, who prefixed to his name the epithet of Divine.

An edition, now rare, of his poetical works appeared after his death under the title 'Obras en Verso de Hernando de Herrera,' Sevilla, 1582, 4to. Another equally rare is, 'Versos de Hernando de Herrera, emendados y divididos por él en 3 libros,' Sevilla, 1619, 4to.

Of his prose writings those remaining are, 'Relacion de la Guerra de Chipre, y Suceso de la Batalla de Lepanto,' Sevilla, 1572, 8vo.; and 'Vida y Muerte de Thomas Moro' (translated from the Latin of Stapleton), Sevilla, 1592, 8vo., and Madrid, 1625, 8vo.

HERRERA, FRANCISCO DE, surnamed *El Viejo* (the Elder), was born at Seville, 1576. He was one of the most eminent of the Spanish painters of the school of Seville. Among his best works are the Last Judgment in the church of St. Barnard, the Descent from the Cross, and the Effusion of the Holy Ghost, in the church of S. Ines, and, in fresco, the cupola of S. Bonaventura; all at Seville. He also worked in bronze, and has left some etchings. In 1647 he completed his works in the episcopal palace at Seville, and went, in 1650, to Madrid, where he died, some say, in the same year; others in 1656.

HERRERA, FRANCISCO DE, the Younger (*El Mozo*), painter and architect, son of the preceding, inherited his father's talents. The father being a man of a tyrannical disposition, his son left him, and went to Rome to pursue his studies. After his father's death he returned to Seville, and eventually went to Madrid, where he became principal painter to the king, and superintendent of the royal edifices. He died in 1685, aged 63.

HERRICK, ROBERT, was born in the year 1591. Of his life few or no particulars are known, except that he was vicar of a parish called Dean Prior in Devonshire for the space of twenty years, was ejected by Cromwell and restored by Charles II., and long held in remembrance by his parishioners as a poet. His poems were published in 1647–8 under the title of 'Hesperides, or the Works, both Human and Divine, of Robert Herrick, Esq.' The 'Hesperides' have been reprinted in 2 vols. 4to., and 2 vols. sm. 8vo.; 'Select Poems,' 1 vol. sm. 8vo.; 'Poetical Works', 2 vols. sm. 8vo.

HERRING. [Clupeidæ.]

HERRING FISHERY. [Fisheries.]

HERSCHEL, WILLIAM (frequently, but erroneously, written Herschell), was the second son of a musician at Hanover, and was born November 15, 1738. His father brought him up to his own profession, with a good education in other respects. At the age of fourteen he was placed, it is said, in the band of the Hanoverian regiment of guards, which regiment he accompanied to England at a period which is variously stated from 1757 to 1759. Another account states that he came to England alone. After his arrival, he was for some time at Durham, where he is said to have superintended the formation of a band for the militia, and afterwards was for several years organist at Halifax, where he employed himself in teaching music and studying languages.

About 1766 he was organist of the Octagon chapel at Bath; in which place he began to turn his attention to astronomy. Though not a mathematician of the first order, his attainments in that science were more than respectable. The earliest writing of Herschel which has come to our knowledge is the answer to the prize question in the 'Ladies' Diary' for 1779, namely: 'The length, tension, and weight of a musical string being given, it is required to find how many vibrations it will make in a given time, when a small given weight is fastened to its middle and vibrates with it.'

His astronomical pursuits led him to desire a telescope, and, as the purchase of a good reflector was 'fortunately' above his means, he resolved to make one for himself. After many trials he succeeded in making a Newtonian telescope of five feet focal length.

Herschel began to contribute to the 'Philosophical Transactions' in 1780, and in 1781 announced to the world his discovery of a supposed comet, which soon turned out to be a new planet. [Uranus.] It is the method which gave rise to it on which this part of Herschel's fame must rest. Perceiving how much depended upon an exact knowledge of telescopic phenomena, and a perfect acquaintance with the effect produced by differences of instrumental construction, he commenced a regular examination of the heavens, taking the stars systematically in series, and using one telescope throughout. Herschel was not a dilettante

star-gazer, but a volunteer carrying on with no great pecuniary means a laborious and useful train of investigation.

The announcement of this comet or (as it turned out) planet drew Herschel immediately into the full blaze of fame; and George III. honoured his reign by immediately attaching the new astronomer to his court under the title of private astronomer to the king, and with a salary of 400*l.* a year. Herschel fixed his residence first at Datchet, and afterwards at Slough, near Windsor, and his abode became, as Fourier remarks, one of the remarkable spots of the civilised world. His family consisted at first of one of his brothers, and his sister, Miss Caroline Herschel, who was his coadjutor and assistant in his computations and reductions, and was also employed in observation, having been, among other things, the discoverer of as many as eight comets, and the collector of a catalogue of 561 stars observed by Flamsteed, but omitted in his great work. This lady retired to Hanover at the death of her brother, where she died, January 9, 1848, in the 98th year of her age.

Herschel married a widow lady, Mrs. Mary Pitt, and left one son, whose name has long been known to the public as one of the most active and successful adherents of science that our day has produced.

Herschel was soon in affluent circumstances, partly by the profits arising from the sale of his mirrors for reflecting telescopes, and partly by the jointure of his wife, which was considerable, and he died wealthy. His death took place on the 23rd of August, 1822.

Herschel must be remembered by the number of bodies which he added to the solar system, making that number half as large again as he found it. Including Halley's comet, and the four satellites of Jupiter and five of Saturn, the number previously known was eighteen; to which he added nine, namely, Uranus and six satellites, and two satellites to Saturn. His discovery of the rotation of Saturn's ring, his measurements of the rotation of Saturn and Venus, his observations of the belts of the former, and his conjectural theory, derived from observation, of the rotation of Jupiter's satellites, with a large number of minor observations, prove that no one individual ever added so much to the facts on which our knowledge of the solar system is grounded. To this we must add, that his announcement (in 1803) of the motions of binary stars round each other was accompanied by the first proof that there exists in the universe organised systems besides our own; while his writings on the Milky Way, the constitution of nebulæ, &c., &c., gave an experimental foundation to the conception that what was called the universe might be, and in all probability is, but a detached and minute portion of that interminable series of similar formations which ought to bear the name.

The instrument by which this great work was achieved was the reflecting telescope. The second reflecting surface which is found in the constructions of Newton, Gregory, and Cassegrain, having been rejected, and the eye-piece applied directly to the image produced from the large mirror, forms the distinguishing feature of the Herschelian telescope. Herschel had constructed more than one such instrument of 20 feet focal length before he attempted the enormous one of 40 feet, the apparatus for supporting and directing which may be seen by the traveller in passing through Slough. This instrument was begun in 1785, and Herschel dates the completion from August 28, 1789, on which day he discovered with it the sixth satellite of Saturn.

The catalogues of double stars, nebulæ, &c., and of the comparative brightness of stars, would alone constitute a title to the name of a distinguished astronomer, and the optical researches, with those on the refrangibility of heat, are highly valuable; while the papers on the power of telescopes should be read by all who wish to understand those instruments.

HERSCHELLITE, an hexagonal crystalline mineral, translucent, white, and having a specific gravity of 2.11.

HERSFELD. [HESSE-CASSEL.]

HERTFORD. [HERTFORDSHIRE.]

HERTFORD COLLEGE was one of the colleges of Oxford. As a college this foundation was comparatively recent, but as a hall it had been of much greater antiquity. Hertford Hall, or, as it was corruptly designated, Hert or Hart Hall, appears to have obtained its name from Elias de Hertford, who, in the reign of Edward I., let it out to clerks. In A.D. 1312 it was conveyed to Walter Stapledon, bishop of Exeter, and founder of Exeter College, who procured a licence from the king to grant this and another messuage, called 'Arthur Hall,' to twelve scholars studying in Oxford. The scholars of these halls were, with their rector, removed to Exeter College, of which the hall became a dependency. In 1710 Dr. Richard Newton was inducted as principal, and, Aug. 27, 1740, obtained a royal charter for raising Hart Hall into a perpetual college for the usual studies.

The statutes of Dr. Newton appear to have been injudiciously framed. The regard to rigid economy which led him to fix the maximum of remuneration was inconsistent with a consideration of the rise of markets; and the benefactions which were added were insufficient for its maintenance. The society subsisted for some years on its scanty funds; but the foundation was dissolved in 1818. A certain portion of the college funds, reserved for the use of the then only surviving Fellow, was, on his death, appropriated to the establishment of a University Scholarship for the encouragement of Latin literature. The statutes for the establishment of the scholarship passed Convocation April 28, 1834. The election is yearly. The greatest proficient in the Latin language among the candidates is elected, and no scholar is admissible for re-election.

HERTFORDSHIRE, an English county situated between 51° 36′ and 52° 5′ N. lat., and 0° 13′ E. and 0° 45′ W. long. It is bounded N. by Cambridgeshire, E. by Essex, S. by Middlesex, W. by Buckinghamshire, and N.W. by Bedfordshire. Its length from N.E. to S.W. is 39 miles; its greatest breadth, N.W. to S. E., 25 or 26 miles.

Its area is 630 square miles, or 403,200 acres. The population in 1841 was 157,207.

Surface, Rivers, &c.—Hertfordshire has no lofty hills. The highest elevations are the Chalk Downs. Kensworth Hill, just within the border of the county, near Dunstable, is 908 feet high. The surface of the county is generally undulating, and from the abundance of wood presents a variety of pleasing scenery.

The rivers for the most part belong to the basin of the Thames. The principal are the Colne and the Lea: the Hiz and some other streams in the northern part of the county belong to the system of the Ouse. The Lea rises in Luigrave or Leagrave Marsh, near Luton, in Bedfordshire. Its whole length, from the source to its junction with the Thames at Bromley, near London, is above 50 miles. The navigation commences at Hertford.

The Colne, a feeder of the Thames, rises between Idlestree, or Elstree, and Barnet, and flows through a projecting part of the county of Middlesex into Hertfordshire again, which it leaves at Rickmansworth. The streams which belong to the system of the Ouse have but a small part of their course in this county.

The New River, which is brought to London from springs in the neighbourhood of Ware, has a feeder from the Lea near that town. A part of its course is in Hertfordshire: it is carried along the valley of the Lea, and nearly parallel to the course of that stream. The New River was begun in 1608.

The only navigable canal in Hertfordshire is the Grand Junction, which enters the county near Tring.

The high North road runs through this county, and also the London and Birmingham Railroad, nearly in the line of the Grand Junction Canal.

Geology, Climate, and Agriculture. — This county is comprehended in the chalk basin of London. The S.E. and S.W. parts are occupied by the London clay. From under this the plastic clay crops out, and extends to a line drawn from the Stort, between Sawbridgeworth and Bishop's Stortford, to the north of Ware, Hertford, and Hatfield, to St. Albans, and from thence along the valley of the Colne. To the N.W. of this line all the county is occupied by the chalk, excepting a few spots along the border of Bedfordshire, where the subjacent strata crop out.

This county has no minerals of any value: there are a few medicinal springs, chiefly chalybeate; the principal are on Barnet Common, Northaw Common, and at Cuffley, in Northaw parish, all near the Middlesex border.

The climate is as mild and genial as that of most of the inland counties. The harvest is early where the soil is light and rich, as is the case in some of the valleys. On the cold wet clays, which are found in some parts of the county, and the most exposed tops of the chalky hills, the crops are later. The soil may be divided into chalk, clay, and gravel; and the mixture of them forms loams of various qualities.

The loams are generally well cultivated, but the heavy clays are capable of much improvement. Wherever the turnip husbandry prevails, the superiority of the crops is striking. Wheat, beans, oats, and fallows are the only varieties. Clover is much less in quantity than might be desired, and by no means so clean as it ought to be. Draining has been resorted to by some proprietors and lessees; but where farms are let at rack-rent, and from year to year, as is often the case, no permanent improvement can be expected.

The number of resident gentry in Hertfordshire tends to introduce a high state of cultivation around their immediate residences; but, as the mansions are generally erected in the driest and best situations, the cold wet clays are neglected. The old heavy plough with four horses in a line may still be seen; and in some places the heavy loams mixed with flints and stones can scarcely be moved with less power: but a great improvement might be made in the construction of the plough; and effectual draining, with the use of the subsoil plough, would greatly lighten the texture, and enable lighter ploughs and fewer horses to stir them sufficiently.

Hertfordshire has been remarkable for its high banks and hedges. In many of the lanes, where two carriages could scarcely pass one another, it is difficult for a man standing on a waggon to see over the hedge. Wherever the old high banks have been levelled, and neat quick hedges have been planted in their stead, the ground which has been gained has soon paid the expense.

It cannot be said that there is any peculiar system of cultivation in Hertfordshire. Every system may be occasionally met with. The consequence has been a very great difference in the crops of adjoining farms. The crops are reaped as close to the ground as possible, in order that the straw may be sold in London, and manure brought back in return. The corn is thrashed chiefly by hand, the straw thus produced being of greater value for horse litter. Fewer cattle are fed in winter than in more distant counties, as manure can be obtained without them.

A species of rough garden husbandry has been introduced on the best soils nearest to London for the growth of early potatoes, cabbages, peas, and other culinary vegetables, which are succeeded in the same year by other crops, the whole being forced by an abundance of manure. The plough is used, but a great portion of the labour is done by the spade and the hoe.

There are many orchards in Hertfordshire, chiefly for apples and cherries, which are sold in London. No cider is made. There are many woods and coppices in the poorer soils, but they are fast diminishing in number.

There are no breeds of cattle peculiar to Hertfordshire. A few pigs are bred, as they are on most well-managed farms: the breeds are the Essex or Berkshire, and crosses of these with the Chinese and Neapolitan.

Divisions and Towns.—Hertfordshire is divided into 8 hundreds. It is chiefly in the diocese of Rochester. It is in the Home circuit. The assizes are held at Hertford. The county returns 3 members to parliament; and the boroughs of Hertford and St. Albans 2 members respectively, making 7 in all.

The following are the principal towns, with the population of each in 1841:—

St. Albans. [ALBANS, ST.]

Baldock is 37 miles from London. The town is said to have been built by the Knights Templars before the time of Henry III. The church is a large and handsome Gothic edifice. There is a range of six almshouses in the High Street. A considerable trade is carried on in malt. Population 1807.

Barnet is about 13 miles N.W. from Hertford, and 11 miles from London. It formerly belonged to the abbot of St. Albans, to whom the market was granted in the reign of Henry II., whence its title of Chipping Barnet. The country around is celebrated for its hay, and a great deal of business is done at the market, which is on Monday. The church was erected in 1400, by John Mort, bishop of St. Albans. It contains many ancient monuments. In 1471 the decisive battle of Barnet was fought on Gladsmore Heath, near the town. Population 2485.

Berkhampstead is 26 miles from London (or 28 by the North-Western Railway), and about 18 from Hertford. It enjoys a considerable trade, which is assisted by the navigation of the Grand Junction canal. The town is large and handsome. It was called by the Romans *Durobrivæ*, and became a place of some eminence under the Saxons. The church is a Gothic structure of considerable beauty, containing numerous interesting monuments. Among the schools in the town is a free grammar-school, founded in the reign of Henry VIII. Population, 2802.

Bishop's Stortford is distant from London 30 miles, or 32¼ by the Eastern Counties Railway. It takes its name from the river Stort and the fact that the manor belonged from a very early period to the Bishops of London. The town is built in the form of a cross, the two principal streets intersecting each other, with the market place in the centre. A great deal of corn is accumulated here, and the malting trade carried on to a great extent. The general business of the town is much facilitated by a canal communicating with the Lea. The church possesses a fine lofty tower. Population, 4681.

Broxbourne, a place of little importance, except as a large station on the Eastern Counties Railway, 19 miles from London. It contains a church dedicated to St. Austin. Population, 643.

Buntingford is 31 miles from London, and about 9 from Hertford. It has a brick chapel built above two hundred years ago. Population, 581.

Cheshunt, a village 16¼ miles from London by the Eastern Counties Railway, and about 6 S.S.E. from Hertford. The name is written in Domesday 'Cestrehunt,' from which it has been conjectured that it was a Roman station. Population of the parish, 5402.

Hatfield is 19½ miles from London, and about 3 W.S.W. from Hertford. The manor of Hetfelle (as it is called in Domesday) was granted by King Edgar to the abbey or monastery of St. Ethelred at Ely, and upon the erection of that abbey into a bishopric, A.D. 1108, is supposed to have acquired the designation of Bishop's Hatfield. The bishops of Ely had a palace at Hatfield which, with the manor, was made over to the crown in the time of Henry VIII.: the palace was the residence of Prince Edward, afterwards Edward VI. Elizabeth held her first privy-council here. The gateway and west end of the palace are still standing. Population of the parish, 3646.

Hemel Hempstead is 23½ miles from London, and about 15 W.S.W. from Hertford. The town consists chiefly of one long street. The females of the town are much engaged in making the straw-plat, and there are corn and paper mills in the neighbourhood. The town-hall is a long narrow building with an open space under for the market, which is one of the largest in the county for corn. The church, a large building, is partly of Norman architecture, of which the west door is a fine specimen. Population, 5901.

Hertford, the county-town, is in a low valley below the junction of the Maran or Mimram, and just above that of the Beane, with the Lea, which last-mentioned river runs through the town. It is 26 miles from London by the Hertford branch of the Eastern Counties Railway.

The town is irregularly laid out, but the streets are well paved and lighted with gas. It has two parish churches. Near the east end of the town is a large building belonging to the governors of Christ's Hospital, in London, at which a number of the girls and of the younger boys of that charity receive their education. The buildings can contain 500 children, with their needful attendants. Haileybury College, for the instruction of students intended for the civil service of the East India Company, is at a short distance from the town.

No manufacture is carried on at Hertford, but a good deal of business is done in malting, and there are many corn-mills on the Lea, the Mimram, and the Beane. The market, which is on Saturday, is one of the largest corn markets in the kingdom. It is a municipal borough, and is governed by 4 aldermen and 12 councillors. The assizes for the county are held here. Population of the municipal borough, 5450. Hertford returns two members to parliament. Population of the parliamentary borough, 5463.

Hertford is a place of considerable antiquity. About A.D. 905 Edward the Elder built the castle, and rebuilt the town, which had probably been ruined by the Danes. Jean II., king of France, and David, king of Scotland, spent part of their captivity here during the reign of Edward III. Queen Elizabeth occasionally resided and held her court in the castle. There are national, grammar, and charity schools in the town.

Hitchin is 34 miles from London, and about 16 N.W. from Hertford. The town, which consists of several streets, is irregularly laid out. The principal trade is in corn and malt. Much straw-plat is made; there are some breweries, and also a silk-mill. The church is a handsome edifice, built upon the foundations of a more ancient structure. The south porch is a remarkably fine specimen of Gothic architecture in the perpendicular style, and there is a font of the same charac-

ter; also numerous sepulchral monuments and brasses. There are several public schools. Population, 5658.

Hoddesdon is a hamlet 17 miles from London. The town consists chiefly of two long streets. The ancient market-house, a wooden edifice supported on arches and pillars curiously carved, is in the middle of the town. The chief business of the town is malting. The church is large, of perpendicular character, with some elegant chapels and ancient monuments. Population, 1743.

Rickmansworth is 18 miles from London, and about 27 from Hertford. The town is irregularly laid out. The church was rebuilt some years ago with the exception of the tower. There are several paper and flour mills near the town: and some straw-platting and horse-hair weaving is carried on. The Grand Junction Canal passes through the town. Near Rickmansworth is Moor Park, which was the residence of Cardinal Wolsey, of the unfortunate James, duke of Monmouth, and of Lord Anson. The town contains several free schools. Population, 5026.

Royston is 37½ miles from London, and about 17 from Hertford. It is situated partly in Cambridgeshire. The principal business is malting; a large corn trade is also carried on. The church was formerly the conventual church of a priory of the regular canons of St. Augustine. A brick building in the northern part of the town was once the occasional residence of James I. There are schools of various descriptions in the town. Population, 2002.

Tring is 31¾ miles from London by the North-Western Railway, and about 23 miles from Hertford. The town is neat, and contains several good houses. The church is an ancient building, with a massive tower, and contains some ancient monuments. There are various schools. Population, 3605.

Ware is 20 miles from London, and 3¼ miles from Hertford by the Hertford branch of the Eastern Counties Railway. Up to this place the Danes, in the reign of Alfred, brought their vessels, and protected them by a dam or weir across the river, from which weir the town is said to have obtained its name; the Lea is navigable to Ware. The church consists of a chancel, with a chapel on each side; a nave with two side aisles, and two projections resembling transepts; with a square embattled tower. There is considerable trade at Ware; the market is one of the greatest in the county for corn. At one of the inns in this town is a large bedstead, 12 feet square, elaborately carved in oak, and probably of the age of Queen Elizabeth. It is alluded to by Shakspere ('Twelfth Night,' act iii., scene ii.), and is popularly known as the Bed of Ware. There are numerous schools in the parish. Population, 4653.

Watford is 17¾ miles from London by the North-Western Railway. The town consists principally of one main street, about a mile in length, near the centre of which stands the church. There are considerable silk-mills, and also a paper-mill. Population, 3697.

History and Antiquities.—At the time of Cæsar's invasion, Hertfordshire seems to have belonged to the Catyeuchlani (Κατυευχλανοι, Ptol.) or Catuellani (Κατουιλλανοι, Dion), of whom Cassivellaunus, the antagonist of Cæsar (B.C. 54), is supposed to have been the chief. [BRITANNIA.]

Several of the ancient British roads or trackways crossed this county. The traces of the British Watling Street are obliterated by the Roman road afterwards carried along the same line. Traces of Ermin Street and still more of Icknield Street may yet be recognised. The Romans included Hertfordshire in the province of Flavia Cæsariensis. At Wilbury Hill, three miles west of Baldock, is an ancient camp on the Icknield Way, inclosing about seven acres.

When the Saxons subjugated Britain, Hertfordshire appears to have been included in the two kingdoms of Essex and Mercia. In the invasions of the Northmen, which troubled the close of the reign of Alfred (A.D. 896), they brought their vessels up the Lea to the neighbourhood of Hertford or Ware. Edward the Elder, son of Alfred, built Hertford Castle.

In the civil broils of the reign of John, Hertford Castle was defended for the king by Walter de Godarvil, against the revolted barons and the Dauphin Louis of France. After the general rising of the peasantry under Wat Tyler and Jack Straw, many of the ringleaders were tried and executed at St. Albans. In the war of the Roses this county was repeatedly the scene of contest. The battle of Barnet, in which Warwick fell in battle against Edward IV., was fought in Middlesex just beyond the boundary of Hertfordshire.

On the breaking out of the war between Charles I. and the Parliament, this county was the scene of one of Cromwell's earliest exploits. While yet a captain of a troop of horse which he had raised, he arrested the high-sheriff of Hertfordshire as he was proceeding to St. Albans to publish the king's proclamation declaring all the parliamentary commanders traitors.

HERTHA, or HERTHUS, the Goddess of Earth among the ancient Germans. Tacitus ('Mor. German.,' c. 40) says that she was worshipped by the Suevi, and that her sanctuary was in a grove in an island of the ocean, and was served by a single priest. A cart, covered by a cloth to conceal the goddess, was taken out of the sanctuary on certain occasions, and was drawn by cows about the country with great solemnity. This was a time of general rejoicing, a cessation of war took place, and peace reigned over the land, until the goddess was restored to her sanctuary.

HERVEY, JAMES, born in 1714, was educated at Lincoln College, Oxford. He took orders in the Established Church, devoted his whole life to acts of piety and beneficence, and died early, of a decline, in 1758. For some years preceding he had been rector of Weston-Favell in Northamptonshire. His works are numerous, and all religious. In doctrine he leaned towards the Calvinistic school. The most popular of his works were, 'Meditations among the Tombs,' 'Contemplations in a Flower Garden,' 'On the Night,' &c., 1746-7; and 'Theron and Aspasia; or, a

series of Dialogues and Letters on the most important Subjects,' 1753.

HESDIN. [PAS-DE-CALAIS.]

HESIOD was a native of Ascra, a village at the foot of Helicon, whither his father had migrated from Cuma in Æolis.

The only works that remain under the name of Hesiod are—'The Theogony,' 'The Shield of Hercules,' and the 'Works and Days.' The 'Works and Days' consists of advice given by Hesiod to his brother Perses on subjects relating for the most part to agriculture and the general conduct of life. In its present state the poem shows want of purpose and of unity, too great to be accounted for otherwise than on the supposition of its fragmentary nature. The 'Theogony' consists, as its name expresses, of an account of the origin of the world, including the birth of the gods, and making use of numerous personifications. The 'Shield of Hercules' is a fragment, or rather a cluster of fragments; some of them by very late Rhapsodists, who copied, according to Aristophanes the grammarian, from Homer's description of the shield of Achilles.

The best modern editions of Hesiod are Göttling's (in 1 vol. 8vo., published in the *Bibliotheca Græca*), and Dindorf's, Leipzig, 1825, 8vo.

HESIONE (Zoology), the name of a genus of *dorsibranchiate Annelids*, with a short but rather stout body, composed of a few ill-defined rings. A very long cirrhus, which probably executes the function of branchiæ, occupies the upper part of each foot, which has also another lower one and a packet of fine bristles. The proboscis of Hesione is large, and without either jaws or tentacles.

HESPE'RIDES, in Greek mythology, a family of Nymphs, the daughters of Atlas, by Hesperis, the daughter of Hesperus. They dwelt in a beautiful garden in the western parts of the earth, in which grew the celebrated tree which bore golden apples. These apples were guarded by a fierce dragon named Ladon, which never slept. Hercules killed the dragon and carried off the precious fruit. The gardens of the Hesperides are variously placed—in an oasis of the African desert, in Cyrenaica, at the foot of Mount Atlas, and in the Happy Islands of the Atlantic.

HESPERIDÆ (Stephens), a family of lepidopterous insects of the section *Lepidoptera diurna* of Latreille.

Distinguishing characters:—Antennæ terminated by a distinct club, generally with a minute hook at its extremity; tibiæ with two pairs of spurs, one at the apex, and the other near the middle; claws very small, bifid; body thick; wings small, the posterior pair with a groove to receive the abdomen. The larvæ are pubescent, or naked, and have a large head; pupa smooth, inclosed in a web.

These little butterflies have a large head, and a thicker body and smaller wings than the more typical species; they are moreover at once distinguished from them by their possessing two pairs of spurs, or spines, to the legs; their flight is short and in frequent jerks; hence they have received the name of Skippers.

One species, *Hesperia sylvana*, very common in various parts of England, and chiefly found on the borders of woods, will afford an example of the tribe of which we are treating.

There are several other species of the family *Hesperiidæ* found in this country, of which the *Thymele alveolus* may be noticed. This is a little black butterfly with numerous silver-like spots, and is known to the English entomologists by the name of the Grizzled Skipper.

HESPERIS, a genus of plants belonging to the natural order *Cruciferæ*, and the tribe *Sisymbreæ*. The flowers emit a sweet fragrance during the night, and hence the genus derives its name. *H. matronalis*, Dame's Violet, is the only British species.

HESSE, an extensive country of Germany, which, in ancient times, was inhabited by the Catti. Till about the middle of the 13th century the history of Hesse was blended with that of Thüringen; but Henry Raspe, landgrave of Thüringen, dying without children in 1247, a war for the succession took place, which was terminated in 1263 by a compact, by which Hesse was separated from Thüringen, and assigned to Henry, son of Sophia, duchess of Brabant, daughter of the late landgrave's brother, who was the common ancestor of all the succeeding landgraves of Hesse-Cassel, and the dukes of Hesse-Darmstadt.

HESSE-CASSEL, from the time of William IV., 1592, suffered, in the successive wars which desolated Germany, but did not sustain any loss of territory; on the contrary, it made several acquisitions. After the Thirty Years' War, Hessian mercenaries in the service of other continental powers were employed in almost all the European and Turkish wars; a system which indeed enriched the princes of Hesse, but did not tend to promote the prosperity of the country. The title of elector was first assumed by the landgrave William IX. in 1803, since known as William I.

This prince concluded a treaty with the allied powers, and subsequently became a member of the German Confederation. He died in 1821. His son and successor, William II., embroiled himself seriously with his subjects. He appointed his son, the electoral prince, regent, who entered on his functions October 1, 1831, and succeeded to the electorship Nov. 20, 1847. Meantime fresh discontents arose, and new troubles were caused by the accession of the electorate to the Prussian commercial league. Frederick William has continued to reign up to the present time.

The electorate of Hesse is situated between 50° 6′ and 52° 25′ N. lat., and 8° 25′ and 10° 45′ E. long. It consists of three distinct portions, of which the largest, extending only to 50° 40′ lat. and 10° 15′ long., is bounded N.E. by Hanover and the Prussian province of Saxony, E. by Weimar and Bavaria, S. by Bavaria, W. by Nassau and Hesse-Darmstadt. The detached portions are the county of Schaumburg on the N., surrounded by Hanover and Lippe, and the lordship of Schmalkalden on the E., surrounded by the Saxon principalities and the Prussian circle of Schleusingen. The area of the whole is 4350 square miles.

Divisions.—The electorate is divided into four provinces, with a total population of 754,590.

I. Lower Hesse (366,663 inhab.), divided into ten circles, with 34 towns, 8 market boroughs, and 519 villages. Chief town, Cassel, the capital of the electorate. [Cassel.]

II. Upper Hesse (122,432 inhab.), divided into 4 circles, with 16 towns, 4 market-boroughs, and 206 villages. Chief town, Marburg, the capital, and seat of the university.

III. Fulda (140,713 inhab.), 5 towns, 7 market-boroughs, and 198 villages. It consists of, 1, the grand-duchy of Fulda; 2, the circle of Hersfield; 3, the circle of Hünfield; 4, the lordship of Schmalkalden.

IV. Hanau (124,782 inhab.), 7 chief towns, 14 market-boroughs, 189 villages, divided into circles; chief town, Hanau, at the confluence of the Kinrig and the Main, with a population of 14,834.

Face of the Country, Soil, Climate, and Productions.—The country is in general hilly; but it contains numerous valleys, which in some places expand into more extensive plains. On the S.E. and S. the Thüringerwald, the Rhön, and the Spessart extend their branches into the country from the Saxon duchies and Bavaria, and cover the province of Hanau, and the whole tract between the Werra and the Fulda. The other principal chains are the Hundsrück, the Wesergebirge, and the Vogelsgebirge. The soil is moderately fertile. The climate is on the whole temperate, and everywhere healthy. The principal rivers are the Main, the Weser, the Werra, the Lahn, and the Fulda.

Corn, maize, pulse, and potatoes in great abundance, are cultivated. Flax and timber are staple articles: tobacco, hemp, madder, a few hops, and rapeseed are also among the products. The vine is cultivated only in some parts of Hanau. The pasturage is in general good. Garden produce of excellent quality is raised about Cassel and Hanau. The breeding of cattle is pretty general, but much neglected in some parts. Domestic poultry and game are very abundant. Hesse abounds in mineral wealth, producing silver, copper, lead, iron, quicksilver, cobalt, salt (from saline springs and in great quantities), saltpetre, vitriol, and alum. There are also coals, marble, very fine white alabaster, porcelain, potter's clay, and pipe clay, &c.

Manufactures and Trade.—The manufactures which are chiefly in Cassel, Hanau, and Fulda are insufficient for home consumption. The principal are linen, mostly coarse, which is exported to the value of 300,000*l.* sterling annually; fine linen is made in Cassel and Herzberg. Cotton spinning is pretty general. Schmalkalden manufactures almost all the steel and iron of the country; Grossalmerode is celebrated for its crucibles, which are exported to all parts of the world.

Education.—The great majority of the inhabitants are Protestants (for the most part Calvinists). A law for the emancipation of the Jews was passed in 1833. The Protestant Church is under superintendants; and the Roman Catholic under the Bishop of Fulda, which was erected into a see in 1822. Hesse has a university at Marburg; a lyceum, gymnasia, an episcopal seminary, seminaries for schoolmasters, academies of drawing and painting, and town schools, and elementary schools in all the villages.

HESSE-DARMSTADT, the grand-duchy of which is governed by the second main branch of the house of Hesse, was founded in 1567 by George I., on whose death his dominions were divided among his three sons. Louis V. succeeded him in the principal line; Philip obtained Butzbach, which reverted on his death to the main line; and Frederick, the youngest, was the founder of the junior line of Hesse-Darmstadt, namely, that of Hesse-Homburg. Excepting the ruinous effects of the Thirty Years' War, the reigns of the succeeding princes were on the whole prosperous, and various acquisitions of territory were made. Louis IX., who reigned from 1768 to 1790, was a friend of peace and a patron of the arts and sciences. He found the country burdened with a large debt, which he paid off, and left to his son, Louis X., an improved territory with 300,000 inhabitants. This prince, during his long reign of forty years, was a greater gainer than almost any other German sovereign by the French Revolution; he acquired very large additions to his dominions, and first assumed the title of grand-duke as Louis I. In 1815 the grand-duke joined the German Confederation. His son and successor Louis II. was engaged in continual disputes with the Estates; and disturbances, in some instances attended with bloodshed, broke out on different occasions. He died in June 1848, and was succeeded on the 16th of that month by his son, the present grand-duke, Louis III., born June 9, 1806, and who had been co-regent since March 5, 1848.

The grand-duchy of Hesse-Darmstadt consists of two large portions, which are separated from each other by a long strip of land, extending from east to west, belonging to Hesse-Cassel and the city of Frankfort. It is situated between 7° 50′ and 9° 40′ E. long., and between 49° 12′ and 51° 20′ N. lat., The northern portion is bounded W. by Prussia and Nassau; N., E., and S. by Hesse-Cassel. The southern portion is bounded N. by Nassau, Frankfort, and Hesse-Cassel; and on the other sides by Bavaria and Baden. The area of the whole is about 5000 square miles.

Divisions.—The grand-duchy is divided into 3 provinces.

I. Starkenburg (317,093 inhabitants) contains 22 towns, 24 market-villages, and 382 other villages. Darmstadt is the capital of the grand-duchy. [Darmstadt.]

II. Rheinhessen, that is, Rhenish Hesse (225,445 inhabitants) contains 10 towns and 180 villages. The chief town is Mainz. [Mainz.]

III. Oberhessen, or Upper Hesse (310,141 inhabitants) contains 34 towns, 10 market-villages, and 510 other villages. The chief town is Giessen. [Giessen.]

To the province of Upper Hesse belongs the entirely detached district of Wöhl, or Itter, the

most northern part of the grand-duchy, a wild sterile country, surrounded by the territory of Waldeck.

Face of the Country, Soil, Climate, &c.—A large part of the surface of the country is mountainous. The banks of the Rhine, and the Wetterau, which contain about 400 square miles, are pretty level and very fertile; the remainder of the country is traversed by branches of the Vogelsgebirge, the Odenwald, Taunus, and the Westerwald. Hesse-Darmstadt is on the whole an agricultural country. The chief productions are corn of all kinds, likewise maize and spelt; wheat and rye, flax, hemp, hops, tobacco, pulse, potatoes, wines, both white and red, garden vegetables and fruit, and timber. Rhenish Hesse is nearly destitute of timber. The valleys of the Odenwald and Vogelsgebirge are well adapted to the breeding of cattle, of which there are large numbers. Swine are kept chiefly in Upper Hesse and Starkenburg. Mining is not carried on so extensively as might be expected: it is confined to copper, iron, coals, salt, and brown coal. Cobalt, basalt, lime, sandstone, marble, and slate are found in different parts of the grand-duchy. The chief rivers are the Rhine (2500 feet broad at Mainz), and the Main, and next to these the Lahn, the Schwalm, the Nidder, the Ohm, and the Itter.

Manufactures, Trade, &c.—The chief manufactures are of woollens, cottons, and linen, leather, and hardware. Wine is produced chiefly in Rhenish Hesse. The most considerable manufacturing and trading town is Offenbach, which has two annual fairs. Mainz is the principal place for the transit trade. The exports consist of the natural productions of the country and of some manufactures. Hesse-Darmstadt joined the Prussian commercial league in 1828.

Hesse contains one university (Giessen), several other superior schools, and at least one elementary school in every commune. Out of an entire population of 852,679, there are 404,075 Lutherans, 225,241 Catholics, 40,538 Calvinists, and 29,128 Jews.

HESSE-HOMBURG was a part of the landgraviate of Hesse-Darmstadt, till it came, in 1596, into the possession of Frederick I., youngest son of George I. Frederick Charles Louis succeeded to the government in 1751. In 1806, on the foundation of the Rhenish Confederation, he was obliged to give up the sovereignty to Hesse-Darmstadt, on which he became dependent. The Congress of Vienna however, in 1815, not only restored to him the sovereignty of his ancient principality of Hesse-Homburg, but added to it the lordship of Meissenheim, on the other side of the Rhine. The landgrave therefore is now a sovereign prince, and was unanimously received in 1817 as a member of the German Confederation. Frederick Joseph, his successor, was married in 1818 to the Princess Elizabeth of England, and, dying without issue in 1829, was succeeded by Louis William Frederick. The present landgrave is Ferdinand Henry Frederic, who succeeded his brother in Sept. 1848.

Divisions.—I. The lordship of Homburg, which contains about 58 square miles and 10,473 inhabitants. The chief town, Homburg vor der Höhe, is situated 10 miles N. by W. from Frankfort-on-the-Main, under an eminence, on which the palace of the landgrave is built. The population is 3600.

II. The lordship of Meissenheim, which contains 126 square miles and 13,960 inhabitants. It lies between the Prussian province of the Lower Rhine, the Bavarian circle of the Rhine, and the principalities of Lichtenberg and Birkenfeld. The chief town, Meissenheim, contains 2000 inhabitants.

HESSE-PHILIPPSTHAL, the younger collateral line of the house of Hesse-Cassel, was founded in 1685 by Philip, the sixth son of Landgrave William VI., and was divided by his sons into the two branches of Hesse-Philippsthal and Hesse-Philippsthal Barchfeld: the residence of the former prince is at Kreuzberg or Philippsthal, that of the second at Barchfeld, both on the Werra. They are both of the Calvinist religion, and are neither of them sovereign princes. The reigning prince of the first-named division is Ernest-Constantine, born in 1771, and of the second Charles Augustus Philip Louis, born in 1784.

HESSE-ROTHENBURG. This line was founded by Ernest, the youngest son of the Landgrave Ernest, born 1623, died 1693, who embraced the Roman Catholic religion. The line became extinct by the death of Landgrave Victor Amadeus without issue on the 12th November, 1834, when the possession reverted to Hesse-Cassel.

HESSE'NES, commonly called ESSENES, one of the three great sects into which the Jews were divided in the time of Christ. They are not mentioned in the New Testament, but it has been conjectured that they are alluded to in Matt. xix. 12, Col. ii. 18, 23. Many particulars concerning the customs and religious opinions of this sect are given by Josephus and Philo.

The Essenes generally lived at a distance from large towns, in communities which bore a great resemblance to the monkish societies of later times. They had all things in common, ate at a common table, and were exceedingly abstemious, never partaking of food before sunset. They were clothed in white garments, abstained from wine, and generally led a life of celibacy. They sent gifts to the Temple, but never offered any sacrifices there. The Essenes were exemplary in their religious duties, and were particularly distinguished by their rigid observance of the Sabbath-day. They believed in the immortality of the soul, but not in the resurrection of the body, and maintained the absolute predestination of all events: they held the Scriptures in the greatest reverence, but considered them as mystic writings, and explained them allegorically. They also appear to have possessed sacred books, which explained the peculiar doctrines and practices of their sect. (Philo, *De Vita Contempl.*, vol. ii. p. 475.)

The origin of this sect is uncertain, and their numbers were never considerable: according to Philo and Josephus, there were only 4000 in Palestine.

It has been supposed, with considerable probability, that the early Christians derived many of

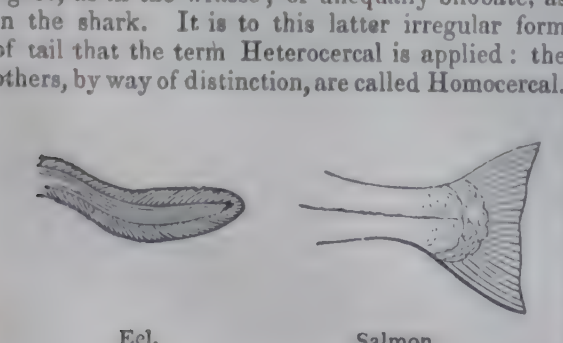
their customs and opinions from the Essenes. Mr. Taylor, the editor of Calmet's 'Dictionary to the Bible,' gives many reasons for believing that John the Baptist belonged to this sect.

HESY'CHIUS, the name of the supposed author of a valuable Greek Lexicon, which contains chiefly short explanations of unusual Greek words, or forms of words, and technical terms. It was not known until the 16th century. The first edition was that of Aldus, 1513, fol.; the most complete, that of Alberti, 1746, 2 vols. fol., of which the second volume was published by Ruhnken in 1766. This edition has a copious body of Prolegomena, containing all that can be said concerning this author.

HESYCHIUS, named the Illustrious, of Miletus, lived in the 6th century, and wrote a universal history in six parts, from Belus down to his own age. Some extracts of it have been preserved, which, with an abridgment of the 'Lives of the Philosophers,' chiefly from Diogenes Laertius, are edited in one volume by Meursius, 1613. (Photius, *Bibl.*, 69.)

HETEROBRANCHIA'TA, M. De Blainville's name for the fourth order of his *Acephalophora*. The 1st Family (*Ascidians*) is divided into two tribes:—1, Simple Ascidians, and 2, Aggregated Ascidians. The 2nd Family consists of the *Salpaceans*, and is also divided into two tribes: 1, the Simple (*Biphora*, &c.), and 2, the Aggregate (*Pyrosoma*).

HETERO'CERCAL, the term chosen by M. Agassiz to express a peculiar form of the tails of fishes, which affords a very obvious, and, as far as yet appears, a very correct indication of the geological age of formations. Among existing fishes the tail is either simple, as in the eel; bifurcate, as in the salmon; expanded to a round figure, as in the wrasse; or unequally bilobate, as in the shark. It is to this latter irregular form of tail that the term Heterocercal is applied: the others, by way of distinction, are called Homocercal.



Eel. Salmon.

Wrasse. Shark.

The peculiarity of the heterocercal fishes is that the vertebral column runs along the upper caudal lobe: in the other forms of tail it is symmetrically placed with respect to the posterior finny expansion. M. Agassiz has found this peculiarity of the tail, which is least common among living fishes, and confined to particular groups, to belong to every species of fishes, of whatever group, and however differing in other respects, which occur in strata older than the oolitic system, while in and above that system homocercal forms appear. It is therefore a characteristic of geological time; and, among the conjectures as to the relations of this form to physical conditions of the surface or laws of the animal economy, we prefer the opinion that it is one among several marks of the sauroid character of the fishes which lived in early geological periods. Some of the fishes of the oolitic rocks exhibit a slight inequality of the lobes of the tail, and some difference in the arrangement of the scales thereon, but without (we believe) the characteristic continuation of the vertebral column into the upper lobe. These may be thought to mark the gradual transition from the heterocercal to the ordinary types of structure. Lepidosteus, with sharks, and other cartilaginous fishes of the existing creation, which were ranked by Linnæus as 'Amphibia Nantes,' thus appear the few surviving representatives of organic forms which, in earlier periods of the history of the globe, were exclusively predominant.

(Agassiz, *Recherches sur les Poissons Fossiles.*)

HETERO'CERUS, a genus of pentamerous coleopterous insects established by Bosc. Latreille places it in his second section of his family *Clavicornes*, and forms of it a tribe under the name of *Acanthopoda*, on account of the flattened broad limbs armed with spines. These beetles have small oval depressed bodies, and eleven-jointed antennæ, the last six articulations forming a cylindrical club. They live in sand or mud, by streams or among marshes, burrowing in the ground by means of their spinous tibiæ. When disturbed or alarmed they come out of their holes. The larvæ live in the same situations with the perfect insects. Several species are found in Britain.

HETEROGANGLIA'TA. The *Heterogangliata* of Professor Owen comprise all the *Mollusca* of Cuvier, with the exception of the *Cirripeda*.

HETEROGENOUS. [HOMOGENOUS.]

HETERO'MERA, the second section of coleopterous insects in the arrangement of Latreille, including such as have five articulations in the first four tarsi, and four in the two posterior. They are all vegetable feeders. Latreille divided the *Heteromera* into four groups: 1st, the *Melasoma;* 2nd, the *Taxicornes;* 3rd, the *Stenelytra;* and 4th, the *Trachelides*. (For details see Cuvier's 'Règne Animal,' vol. v. p. 1., et seq.)

HE'TEROMYS, a genus of Rodents, which, in M. Lesson's opinion, may be advantageously used, though M. Desmarest proposed it without adopting it. The genus is described as having the cheek-pouches of the Hamsters, the general form of the body and tail of the rats properly so called, and the dorsal flattened spines of *Echimys*, Geoff. Example, *Heteromys Thompsonii*, Lesson. Habits and size of a rat. Locality, the island of Trinidad.

HETERO'SCII (other-shadowed), an old astronomical term for persons living in such parts of

the earth that their shadows at noon are always turned contrary ways.

HEUCHE'RA, a genus of plants belonging to the natural order *Saxifragaceæ*, and consisting of about sixteen species. *H. Americana* is a native of North America, where it has obtained, on account of its astringent properties, the name of Alum Root. It contains tannin, and it is to this principle that its astringent character is to be ascribed. The other species contain tannin, but are not used for any purpose in the arts or medicine.

HEVE'LIUS, JOANNES, or more properly JOANNES HEVEL, a Polish astronomer of great eminence, was born at Danzig, of a noble family, January 28, 1611. He applied himself almost exclusively to the study of astronomy. In 1641 he built an observatory in his own house, and furnished it with a quadrant and sextant of three and four feet diameter, together with large telescopes constructed by himself. His scientific pursuits did not however preclude his being elected consul in 1651, to which distinction his rank in society and philosophic character entitled him, and of which he continued to discharge the duties to the time of his death. In 1647 he published a description of the moon, under the name of 'Selenographia,' to which was added a representation of the other planets as seen by the telescope. In 1654 appeared his treatise 'De Motu Lunæ Libratorio,' in the form of a letter to Riccioli, wherein he gave an explanation of the libration of the moon. To these succeeded various other works, and in 1673 the first part of the 'Machina Cœlestis' was published. It was this last work which gave rise to a public controversy between Hevelius and Dr. Hooke. Hevelius always imagined that better observations could be made with plain sights than with telescopes. Hooke recommended the use of the latter. Halley was requested by the Royal Society of London to visit Hevelius at Danzig, and judge of the goodness of his observations. This voyage, which was made in 1679, produced a report from Halley highly favourable to Hevelius. In 1679 he sustained considerable loss by the destruction of his house and observatory by fire. The whole of his instruments and library were destroyed, including most of the copies of the second part of his 'Machina Cœlestis,' which had only been published that year. This second part is now extremely rare. This accident appears only to have had the effect of increasing his ardour in the pursuit of astronomy, for he shortly after erected a new observatory, though on a less magnificent scale, and by 1685 he had another volume of observations ready for publication. He had now been occupied forty-nine years as an observer, and had attained sixty-three years, the climacteric, as it used to be called, of life, for which reason this volume (the last published during his lifetime) is entitled 'Annus Climactericus.' His posthumous works are 'Firmamentum Sobieskianum' (1690) and 'Prodromus Astronomiæ' (1691). He died at Danzig, universally respected, in 1687–8, and in his 76th year.

HEXACHORD, a name given by the ancient Greeks to a lyre of six strings; also to a scale of six sounds. The term hexachord was also applied to a system of musical scales now disused.

HEXAGON, a figure of six sides.

HEXAHEDRON, a solid of six faces.

HEXA'METER (ἕξ, six, μέτρον, measure) is the most common form of dactylic verse. [DACTYLICS.] It consists of six feet, either dactyls or spondees, with no limit in their arrangements, except that the fifth is usually a dactyl, and the sixth invariably a spondee. Great part of the beauty of a long poem written in this measure depends on the varied cadences, which may be produced by varying the cæsura. [CÆSURA.]

HEXAPLA, the plural of ἑξαπλοῦς, which means 'six fold,' was an edition of the Scriptures of the Old Testament prepared by Origen, which exhibited, in addition to the original Hebrew text, six Greek versions in as many parallel columns; namely, the Septuagint, that of Aquila, that of Symmachus, that of Theodotion, one found at Jericho, and one found at Nicópolis in Epirus. It also comprehended a seventh version of the Psalms. The Hebrew text was besides given both in Hebrew and in Greek characters: so that, properly speaking, there were eight columns in all, whence the work is sometimes called Origen's Octapla. Only some fragments of Origen's Hexapla remain, which have been collected and published by Montfaucon under the title of 'Origenis Hexaplorum quæ supersunt,' 2 vols. fol., Paris, 1713.

HEXHAM. [NORTHUMBERLAND.]

HEYDEN, JOHN VAN DER, a Dutch painter of external architecture, born at Gorcum in 1637 (some say 1640). The value of his early works is enhanced by their being adorned with figures by A. Van de Velde. He died in 1712 at Amsterdam.

HEYLIN, PETER, born in 1600, at Burford, in Oxfordshire, studied at Oxford, where he took his degree of D.D. He gave lectures on history and cosmography in that university; and afterwards, in 1625, he published his 'Microcosmos,' or description of the globe. Heylin was appointed chaplain in ordinary to King Charles I. On the restoration of Charles II. he was made sub-dean of Westminster. He died in 1662. He wrote a number of works on the religious and political controversies of the times; among others, a 'Defence of the Church of England;' a 'Life of Bishop Laud;' a 'History of the Tithes,' and a 'History of the Sabbath.'

HEYNE, CHRISTIAN GOTTLOB, born at Chemnitz, in Saxony, in 1729, studied at Leipzig, and distinguished himself as a classical scholar. The chair of eloquence and poetry in the University of Göttingen having become vacant by the death of J. M. Gesner, Heyne was appointed to it in 1763. The department to which Heyne particularly applied himself was that of classical criticism and the illustration of the writings of the ancients, by showing how they ought to be studied with reference to the manners and character of their respective ages. He published his ideas on these subjects in his notes to the 'Bibliotheca' of Apollodórus, and afterwards in numerous dissertations inserted in the Transactions of the Uni-

versity of Göttingen. Heyne's 'Opuscula Academica,' 6 vols. 8vo., Göttingen, 1785–1815, contain many learned and valuable disquisitions on ancient history. Heyne published editions of Homer, Pindar, Diodórus Siculus, Epictétus, Virgil, Tibullus, &c., all enriched with ample commentaries. His 'Antiquärische Aufsätze,' in 2 vols., are essays on the history of ancient art. Heyne died at Göttingen at a very advanced age, in July 1814. His life, which has been written at some length by his son-in-law Heeren (Göttingen, 1813, 8vo.), contains an account of the difficulties that this scholar had to encounter in early life.

HEYWOOD, JOHN, one of our earliest dramatic writers, lived in the first half of the sixteenth century. He was a favourite at the court of Queen Mary, but in the reign of Edward VI. he was accused of plotting against the government. He retired to the continent, and died about 1565, at Mechlin, in Brabant. Heywood's dramatic pieces 'may properly and strictly,' says Mr. Collier, 'be called Interludes—a species of writing of which he has a claim to be considered the inventor.' The earliest of them, 'A mery Play between the Pardoner and the Frere, the Curate and Neybour Pratte,' was not printed till 1533, but must have been written before 1521. In Dodsley's Old Plays will be found his 'Play called the Foure P. P., a new and a very mery Enterlude of a Palmer, a Pardoner, a Potycary, a Pedlar.' Among other productions bearing his name was a posthumous volume of 'Woorkes,' 1576, 4to., which contains proverbs in verse, and six hundred epigrams. In respect of them, and to distinguish him from a later play-writer, Thomas Heywood, he is not unfrequently called 'The Epigrammatist.'

HEYWOOD, THOMAS, a well-known dramatist who lived in the reigns of Elizabeth, James I., and Charles I. Of all his pieces about twenty-four are left, of which 'A Woman killed with Kindness,' published in Dodsley's Collection, is much admired.

HIBERNIA. [IRELAND.]

HIBISCUS, a genus of plants of the natural family of *Malvaceæ*. The species, upwards of 100 in number, of this genus are chiefly herbaceous, though of a large size, but a few are perennial and arboreous. They abound in the hot parts of Asia and America, and also in Africa and the tropical islands. A few extend into Europe, North America, and the Cape of Good Hope. The species are remarkable, like the family to which they belong, for abounding in mucilage, and for the tenacity of the fibre of their bark, whence several are employed for many economical purposes in the different countries where they are indigenous.

The abundance of mucilage in some of the species renders them useful as articles of diet, as the unripe fruit of *H. esculentus*. So in India *H. longifolius* is similarly employed, and much approved of by many Europeans. The calyxes of *H. Sabdariffa* as they ripen become of a red colour and are pleasantly acid, whence in the West Indies the plant is called Red Sorrel. The calyxes are employed there, as well as in India, for making tarts; and a decoction of them, sweetened and fermented, makes a cool and refreshing drink, much used in the West Indies. *H. Syriacus* and *H. Rosa-Sinensis* are known as ornamental plants.

The species of Hibiscus are chiefly useful for the tenacity of their fibre, and hence several are employed in rope-making. Thus *H. cannabinus* is cultivated everywhere in India in the rainy season for this purpose; and its fibre is often imported into Europe as a substitute for hemp. In the island of Otaheite rope and string are manufactured from the bark of *H. tiliaceus*, which is also made into matting of a white colour, and of different degrees of fineness. Almost all the species possess sufficient tenacity of fibre to be used for cordage, whips, &c. They also abound in mucilage, which renders them serviceable as articles of diet.

Hibiscus abelmoschus, so called from *hab-al-mooshk*, the Arabic name of its musk-scented seeds, is now often named *Abelmoschus moschatus*, and formed into a new genus. Its seeds are said to be added to coffee in Arabia, and are in India employed as a cordial medicine.

HICKES, GEORGE, an English divine and philologist, was born June 20th, 1642, at Newsham, in Yorkshire. He was sent to Oxford. In 1665 he became M.A., and in 1679 D.D. at Oxford, having received the same degree the year previous from the University of Glasgow.

Between 1679 and 1683 he had several preferments, and in August of the latter year was made dean of Worcester. In 1688 he refused to take the oaths of allegiance, and was eventually deprived. He was subsequently consecrated suffragan bishop of Thetford by Archbishop Sancroft. He died Dec. 15, 1715.

The work which goes by the name of his 'Thesaurus, or Treasure of the Northern Tongues,' in three volumes folio, Oxford, 1705, is that which is most likely to sustain his literary reputation.

HICKORY. [CARYA.]

HIERA'CIUM, a genus of plants belonging to the natural order *Compositæ*. There are nineteen British species of this genus, but none of them are valuable on account of the properties they possess.

HIE'RES. [HYE'RES.]

HIERO'CHLOE, a genus of grasses belonging to the *Phalacideæ*. One species only of this genus, the *H. borealis*, has been found in Great Britain.

HIE'ROCLES, the name of several Greeks:—

Hierocles, a lawyer, wrote a work on veterinary medicine, addressed to Cassianus Bassus, of which three chapters are preserved in the 16th book of the 'Geopónica,' published by Needham, Camb., 1704, pp. 424, 425.

Hierocles, who probably lived in the sixth century, was the author of a work entitled 'Synecdêmos' (*συνέκδημος*), that is, 'a travelling companion,' which gives an account of the provinces and towns of the Eastern Empire. The 'Synecdêmos' is printed by Wesseling in his 'Vetera Romanorum Itinera,' Amst., 1735.

Hierocles, præfect of Bithynia, and afterwards of Alexandria, wrote two books against Chris-

tianity, entitled 'Truth-loving Words to the Christians.'

Hierocles, a celebrated Alexandrine philosopher of the fifth century, wrote a Commentary upon the Golden Verses of Pythagoras, which is still extant; and also a Discourse on Foreknowledge and Fate, of which Photius has preserved large extracts. A complete edition of his works was published by Needham, Cambridge, 1709. The Discourse on Foreknowledge and Fate was translated into French by Regnaud (Lyon, 1560).

There is also another work, entitled 'Asteia' (ἀστεῖα), containing an account of the ridiculous actions and sayings of pedants and silly persons.

HIEROGLYPHICS, a compound Greek word which means 'sacred engravings,' is the name given to the figures of animals, plants, and other objects sculptured on the Egyptian obelisks, temples, and other monuments, and which were used as a sort of ideographic writing among that people. The name 'hieroglyphics' has been also applied to other figures of a similar kind, used likewise for historical records on the monuments of the Mexicans and other nations. [AZTECS.] The earliest and simplest mode of recording events seems to have been that of picture-writing, or a rude delineation of objects, such as that by which the Mexican scouts informed their master Montezuma of the arrival of Cortez and his band of followers, by sketching the appearance of the Spaniards, their ships, horses, and fire-arms. For ordinary purposes the Mexicans had symbolical or conventional hieroglyphics to express historical events and other occurrences. But picture-writing soon becomes too cumbersome and imperfect a process for recording facts, and some method must be contrived for shortening and facilitating the task. This is effected at first perhaps by sketching only a part for the whole, such as a scaling-ladder for a siege, some flying arrows to indicate a battle, &c. The path of figurative imagery, being once entered into, leads to symbols, in which one thing is put for another on account of some real or supposed resemblance between them: thus an eye with a sceptre underneath denotes the king or kingly power; a hawk's head surmounted by a disc represents the sun, &c. By a combination of such symbols an event may be recorded, and will present itself to the mind of the beholder who has the key of the system, without the assistance of words. In fact, even to many of us who are in the habit of reading, the written or printed words often act upon our minds as hieroglyphics; the sight of a group of certain characters to which we have been long accustomed immediately conveys to our minds the idea expressed, without any reference to sound or alphabetical spelling. The subject of Egyptian hieroglyphics has attracted great attention within the present century, and it was proved by Dr. Young that in certain cases the Egyptians used pictorial representations to represent alphabetical or syllabic sounds. Champollion prosecuted the discovery of Young; and the mass of literature relating to the subject of Egyptian hieroglyphics is now very great. The value of it however is very small, in whatever way we view it.

Further information on this subject may be found in Young's 'Account of some recent discoveries in Hieroglyphical Literature and Egyptian Antiquities,' London, 1823; and in the 'Egyptian Antiquities,' published under the superintendence of the Society for the Diffusion of Useful Knowledge.

HIERON I. succeeded his brother Gelon, as tyrant or ruler of Syracuse, 478 B.C. After the death of Theron, prince of Agrigentum, Hieron defeated his son, Thrasydæus, who was soon after expelled by his countrymen. Hieron took Naxus and Catana, and, having driven away the inhabitants from both towns, he replaced them by Syracusan and Peloponnesian colonists. His chariots repeatedly won the prize at the Olympic Games, and his success on those occasions formed the theme of some of the odes of Pindar, who was his guest and friend. Æschylus, Simonides, Bacchylides, and Epicharmus were also well received at the court of Hieron, who was fond of the society of learned men. Hieron died at Catana, 467 B.C., and was succeeded by his brother, Thrasybulus.

Coin of Hieron I. British Museum. Silver.

Reverse.

HIERON II., son of Hierocles, a wealthy citizen of Syracuse, and a descendant of Gelon, served with distinction under Pyrrhus in his Sicilian campaigns. After Pyrrhus had abandoned Sicily, the Syracusan troops chose Hieron for their leader, and the senate and citizens ratified the choice, 275 B.C. By marrying the daughter of Leptines, a man of influence among the aristocratic party, he secured their support. Having led the army against the Mamertines, a band of Campanian mercenaries, whom he defeated, the main body of them returned to Syracuse, where, through the influence of Leptines, he was proclaimed king, B.C. 270. The Mamertines of Messana, being threatened by Hieron and the

Carthaginians, applied to the Romans for assistance. The Consul Appius Claudius marched to Rhegium, and having passed the strait in the night, unobserved by the Carthaginian cruisers, he surprised Hieron's camp, routed the soldiers, and obliged Hieron to seek for safety in flight. The consul next attacked the Carthaginian camp with the same success, and this was the beginning of the first Punic War, 264 or 265 B.C. In the following year the Romans took Tauromenium and Cátana, and advanced to the walls of Syracuse, when Hieron obtained peace on condition of paying 100 talents of silver, and supplying the Roman army with provisions. He punctually fulfilled his engagement, remained faithful to Rome during the whole of the war, and by his supplies was of great service to the Roman armies. Hieron was included in the peace between Rome and Carthage, by which his territories were secured to him, and he remained in friendship with both states. The period which elapsed between the end of the first and the beginning of the second Punic wars, from 241 to 218 B.C., was most glorious for Hieron and most prosperous for Syracuse. Commerce and agriculture flourished, and wealth increased to an extraordinary degree. Hieron paid particular attention to the administration of the finances, and issued wise regulations for the collection of the land tax, which remained in force throughout Sicily long after this time. He embellished and strengthened Syracuse, and built large ships. Archimédes lived under Hieron's reign. When the second Punic War broke out, Hieron continued true to his Roman alliance. He lived to see the battle of Cannæ, after which his own son Gelon embraced the part of the Carthaginians. Gelon however died, not without suspicion of violence, and Hieron himself, being past 90 years of age, died shortly after, 216 B.C., leaving the crown to his grandson, Hieronymus.

Coin of Hieron II. British Museum. Copper.

Reverse.

HIERO'NYMUS, grandson of Hieron II., king of Syracuse, succeeded him on the throne at the age of fifteen (B.C. 216). The court of Syracuse, which under Hieron was orderly and respectable, soon became as profligate as it had been under the younger Dionysius. After the battle of Cannæ, Hieronymus declared war against the Romans, but a conspiracy broke out among his soldiers, and he was murdered, after a reign of thirteen months. On this news a popular insurrection took place at Syracuse, the daughters and grand-daughters of Hieron were murdered, and royalty was abolished.

HIERRO. [CANARIES.]

HIGDEN, RANULPH, or RALPH, author of the 'Polychronicon,' was a Benedictine monk of St. Werburgh's monastery in Chester, where he died at a great age, after having lived in the convent 64 years; according to Bale, in 1367; according to Pits, in 1373. John de Trevisa's translation of the 'Polychronicon' was printed by Caxton, in folio, in 1482, in seven books, to which Caxton added an eighth. The 'Chester Mysteries,' exhibited in that city in 1328, have been ascribed to Higden.

HIGGINS, or HIGINS, JOHN, was born about 1544. He was educated at Oxford. He was one of the contributors to the 'Mirror for Magistrates,' to which he supplied forty legends, relating mostly to the mythical history of England.

HIGH COMMISSION COURT, a tribunal established by Queen Elizabeth under the authority of a clause in the Supremacy Act (1 Eliz. c. 1), which exercised arbitrary power in matters of faith and in ecclesiastical concerns, as the Star Chamber did in civil affairs. The commissioners were forty-four in number, of whom twelve were ecclesiastics; and three commissioners constituted a quorum. It exercised its powers without control, and was authorised to resort to the rack, to torture, inquisition, and imprisonment, and to proceed, not upon information, but at discretion, upon rumour and suspicion.

In 1641, this Court and the Star Chamber were both abolished. James II. issued a new commission, but the Revolution swept away this arbitrary institution.

HIGH WYCOMBE. [BUCKINGHAMSHIRE.]

HIGHGATE. [MIDDLESEX.]

HIGHMORE, JOSEPH, a portrait and historical painter, was born in London in 1692. He was the nephew of Highmore, Serjeant-painter to William III., and became the pupil of Sir Godfrey Kneller. We owe to Highmore one of the best practical books on perspective, 'The Practice of Perspective, on the principles of Dr. Brook Taylor.' Highmore painted many portraits of royalty, nobility, and gentry, one of the best of which is that of Young, the poet, at All Souls' College, Oxford. His historical pieces are of only average merit: one of the best, 'Hagar and Ishmael,' was presented by him to the Foundling Hospital, where it still remains.

HIGHWAY. [WAY.]

HIGHTEA, a genus of fossil plants from the Isle of Sheppey.

HILA'RION, SAINT, the founder of monastic institutions in Palestine, was born at Tabatha, about A.D. 291. His parents, who were heathens, sent him at an early age to Alexandria,

to pursue his studies. Having been converted to the Christian religion, he resolved to retire from the world. Accordingly, on his return to Palestine, he divided among his relatives the property which his parents had left him, and retreated at the age of fifteen to the desert country south of Gaza. After remaining in this place for 22 years, during which time he practised the greatest austerities, his reputation for sanctity became so great, that numbers resorted to him in order to be cured of their diseases. He afterwards went to Egypt, and successively visited Sicily, Dalmatia, and Cyprus, where he died about the year 371.

HILA'RIUS, a native of Sardinia, was made deacon of Rome about A.D. 354. He is frequently mentioned by Jerome ('Adv. Lucif.') as a rigid Luciferian, a sect which derived its name from Lucifer, bishop of Cagliari, in Sardinia, who separated from the church on account of the absolution that had been granted to those Catholics who had become Arians during the reign of Constantius. Hilarius wrote several works in favour of the opinions of Lucifer, and is generally supposed to have been the author of a Commentary on thirteen of St. Paul's Epistles, which is usually printed with the works of St. Ambrose.

HILA'RIUS, SAINT, was born at Poitiers, of which place he was afterwards made bishop about A.D. 354. He is distinguished in ecclesiastical history by the active part which he took against the Arians during the reign of Constantius. He died in 367.

The most important of Hilarius's works are:—1, 'Twelve Books concerning the Trinity;' 2, 'A Treatise on Synods,' addressed to the bishops of France and Britain, in which he gives an account of the creeds which had been adopted by the Eastern churches since the council of Nice; 3, 'Three Discourses addressed to Constantius,' on the Arian Controversy; 4, 'Commentary on St. Matthew;' 5, 'A Commentary on the Psalms.' These commentaries are entirely taken from the commentaries of St. Augustin.

HILA'RIUS, SAINT, was born A.D. 401, and became bishop of Arelate (Arles) in 429, on the death of Honoratus. Hilarius was distinguished by the holiness of his life and his zeal for monastic institutions; but he is more known in ecclesiastical history on account of his controversy with Leo, bishop of Rome. He died in 449. The writings of Hilarius are lost, with the exception of a life of Honoratus, a letter to Eucherius, and a poem upon the beginning of Genesis; which are published by Quesnel at the end of Leo's works, Paris, 1675. His life of Honoratus has also been published by Genebrard, Paris, 1578.

HILARIUS, a native of Sardinia, succeeded Leo I., or the Great, as bishop of Rome in the year 462. He had been employed by Leo in important affairs; among others he was sent as legate to the council of Ephesus, A.D. 449, against the Eutychians, and was well versed in matters concerning the discipline of the church, which he displayed great zeal in enforcing. Hilarius died at Rome, A.D. 467.

HILDBURGHAUSEN. [SAXE-MEININGEN.]

HILDESHEIM, a government in the kingdom of Hanover, consisting of the principality of Hildesheim, which forms the most southern part of Hanover Proper; of the principalities of Göttingen and Grubenhagen, which form an isolated portion of Hanover lying between Brunswick, Hesse-Cassel, and Prussian Saxony; and of the county of Hohnstein, another isolated district which lies S.E. of the preceding, and extends southwards from the Brunswick circle of Blankenburg into the Erfurt division of Prussian Saxony. The area and population, in 1845, were as follows:

	Area in sq. miles.	Population.
Hildesheim . .	722.9	162,272
Göttingen . . .	647.3	114,435
Grubenhagen . .	280.6	74,521
Hohnstein . .	72.4	9,699
Total . . .	1723.2	360,927

In the south the surface of the principality of *Hildesheim* is traversed by branches of the Harz. The soil is stony and not generally fertile. In the centre and north the surface is undulating, and the soil rich and fertile. The principal rivers are the Innerste, Leine, Ocker, Ecker, and Fuhse. The climate is healthy. The agricultural products are corn, garden vegetables, fruit, flax, hops, and timber: the mineral products are iron, coal, and salt. Linen is the principal manufacture.

The principal town is *Hildesheim*, the capital, which stands on the Innerste, and is a place of considerable extent, but very irregularly built. Population, 14,000. It is divided into the old and the new towns. There are seven gates; the ancient ramparts have been levelled and converted into public walks. The town is the seat of a Roman Catholic bishop, but most of the inhabitants are Lutherans. The cathedral, founded in 818 by Louis the Pious, has 10 altars, very fine paintings on glass, magnificent bronze doors covered with bas-reliefs, and numerous antiquities, among which is a pillar of greenish marble, said to have been a Saxon idol, which now supports an image of the Virgin. There are 3 other Catholic and 8 Lutheran chapels, several hospitals, 2 gymnasiums, and a well-regulated poor-house. The other towns are—*Gosler*, on the Gose, a feeder of the Ocker, which stands at the foot of the Rammelsberg, a northern spur of the Harz, famous for its lead and copper mines; the town, which was once a free imperial city and the residence of the Emperors of Germany, has 6500 inhabitants, and is interesting for the remains of its ancient cathedral (finished in 1050, and partially demolished in 1820), and of the imperial palace; its principal manufactures are beer, spirits, and vitriol: *Peine*, N.E. of Hildesheim, which stands on the Fuhse, and has 3000 inhabitants: *Bokenem* on the Nette, a branch of the Innerste; population, 2500: *Alfeld* on the right bank of the Leine, which has 2600 inhabitants: and *Elze*, a few miles W. of Hildesheim; population, 2000.

GÖTTINGEN and GRUBENHAGEN are described in separate articles.

The county of *Hohnstein* is covered by the Harz Mountains, except towards the south, where it comprises a portion of the Goldene-Aue, which is fertile in corn, and well cultivated. The mountains are covered with forests or with pasture; great numbers of cattle are reared. Iron, copper, cobalt, manganese, coal, marble, limestone, &c. are among the minerals; but iron mines only are worked. The county is divided into two districts, named from the villages of *Neustadt* and *Ilefeld*, which have under 1000 inhabitants each. Near Neustadt are the ruins of the castle of Hohnstein, from which the county is named.

HILL, AARON, was born at Beaufort Buildings, in the Strand, 1684-5. He was educated at Westminster School, and in his sixteenth year, Lord Paget, who was a relation of his mother's, provided him with a tutor, with whom he travelled through a great part of the East. Having subsequently lost his kinsman's favour, he was engaged by Sir William Wentworth as his travelling companion through Europe. On his return he wrote in 1709 a History of the Ottoman Empire, and about the same time was made 'master' of Drury Lane Theatre. At this time he wrote his first tragedy of Elfrida.' He died in 1749-50.

Aaron Hill wrote about fifteen dramatic pieces, of which only two are now remembered, 'Alzira,' and 'Zara,' both of which are adaptations from Voltaire.

HILL, SIR JOHN, was born about 1716, and began life as apprentice to an apothecary in London, in which capacity he gained that knowledge of botany which is his only claim to honourable notice; though, being possessed of lively parts, industry, and impudence, he managed to obtain in his lifetime no little notoriety. He pushed his way into fashionable life; published a fashionable and scandalous newspaper called the 'Inspector;' made, puffed, and sold quack medicines; and yet found time to compose a great number of works, many very voluminous, principally on botanical subjects. Hill obtained a Scotch diploma of medicine, and assumed the title of Sir John in virtue of a Swedish order of knighthood presented to him by the King of Sweden. He died in 1775. The following are some of his most considerable works:—'History of the Materia Medica,' 4to., 1751; 'General Natural History,' 1748-52, 3 vols. fol.; 'British Herbal,' 1756, fol.; 'Vegetable System,' 1759-75, 26 vols. fol.; 'Constitution of Timber from its Early Growth,' fol., 1770.

HILLAH. [BABYLON.]

HILLIARD, NICHOLAS, limner, jeweller, and goldsmith to Queen Elizabeth and to James I., was born at Exeter in 1547. His father, Richard Hilliard, was high sheriff of Exeter and Devonshire in 1560.

There are many miniatures, especially of ladies, by Hilliard extant. He painted Mary, queen of Scots, Elizabeth several times, James I., and Prince Henry. He had for twelve years the exclusive privilege of painting and engraving the portraits of the royal family. He died in 1619.

HILTON, WILLIAM, R.A., was born at Lincoln, on the 3rd of June, 1786. His father, who was a portrait painter, died in 1822. Hilton was placed with J. R. Smith, the engraver, in London, in 1800; he obtained about the same time admission into the Royal Academy as a student, and in 1803 he exhibited at the Academy exhibition a picture of banditti, of extraordinary merit for so young a man. His early works were followed by a series of noble compositions, which greatly distinguished him from the majority of his brother labourers. However, neither his subjects nor his style were popular.

In 1814 he exhibited 'Miranda and Ferdinand bearing a Log;' and he was elected an Associate of the Academy in the same year: he was elected a member in 1820, when he exhibited his picture of 'Ganymede,' which he presented to the Academy as his diploma piece. In 1825 he exhibited his 'Christ crowned with Thorns.' Two years afterwards he succeeded Fuseli as keeper of the Academy, a post which he held until his death, Dec. 30, 1839, in his 54th year.

Hilton died in possession of his best pictures. 'Sir Calepine rescuing Serena,' exhibited in 1831, was purchased by subscription from Hilton's executors, for 500 guineas, and was presented to the National Gallery, where it now hangs. There are two works by Hilton in the Vernon collection, recently presented to the National Gallery —'Rebecca with Abraham's Servant at the Well,' exhibited in 1829; and 'Edith and the Monks searching for the Body of Harold,' exhibited in 1834.

HIMA'LAYA MOUNTAINS, or *Himmáleh Mountains*, extend along the northern boundary of Hindustan, and they constitute likewise the northern boundary of the valley of Asam. They are situated between 27° and 35° N. lat., and 73° and 98° E. long. The entire length of the range is 1500 miles, and the breadth, as far as it is known, varies between 80 and 120 miles. The whole range may therefore occupy a surface of 150,000 square miles and upwards.

The range lies between two plains, a low and level one, drained by the Ganges and the Brahmapootra, and extending along its southern declivity, and the elevated table-land of Tibet, which lies to the north-east and north of the range. The mountains terminate on the plain of the Ganges, in a wall-like range from 4000 to 5000 feet high, which however is frequently broken by gaps through which the rivers escape that carry off the water collected in the interior of the mountain-region.

The enormous masses are separated from one another by valleys, of which the best known are those of Cashmere, the Indus, and the Sutlege. During the summer these upper valleys are covered with a vigorous vegetation, and are used by the inhabitants of the lower valleys as pasture-ground; but during the greater part of the year they are buried in snow, and uninhabited. Through some of these valleys lie the few roads by which the plain of the Ganges communicates with the countries on the table-land of Tibet. Some of the mountain ranges are continually covered with snow. Their elevation varies considerably. The great mass of the Iawahir, which

N. of the Tri Sala Mountains, rises at one point the height of 24,233 feet; but there are other ountains of the altitude of which no estimate n be made; and the eastern portion of the malaya range extending from the western ndary of Bootan is almost entirely unknown.

The portion of the Himalayas between the tlege and Bootan is partly immediately subject the British, or under their protection, and rtly subject to the independent Raja of Nepaul. e British dominions comprehend the countries tween the Sutlege and the Kali Gogra. About e-half is governed by rajas under British pro-ction, and the other half constitutes the district Kumaon, which is annexed to the North-Western Provinces.

These mountains have their southern or dian base clothed with a dense and almost im-enetrable jungle, which separates them from the ains of India. This belt diminishes in breadth we proceed northwards, until it altogether dis-ppears to the north of the Jumna, where, in the untry of the Sikhs, cultivation is carried on se to the foot of the mountains. We have ere the characteristics of a tropical climate, and ith it tropical or Indian vegetation. The crease of temperature being gradual as we scend mountains, so is the disappearance of opical forms in the Himalayas. Indian trees d shrubs soon disappear. On reaching the eight of 5000 feet, scarcely any but Euro-an forms are visible. There is little change the thermometer from night to morning, or om day to day, or week to week, and the tem-rature does not vary 10° of Fahr. for three nths, or from the middle of June to the end of ptember. It is in those months that rice is tivated in these mountains, as well as other opical grains, together with a species of arum, hich is one of the principal articles of the chiefly egetable diet of the hill-people.

The mineral wealth of that portion which longs to the British, or is under their pro-ction, is unknown; but Nepaul contains, accord-g to Sir Francis Hamilton, rich mines of copper, n, and lead. Notwithstanding the apparent bar-nness of much of the country on the declivities the Himalayas, nowhere are the flocks of cattle ore conspicuous for number and variety. The ld and dry atmosphere is particularly favourable the shawl-goat. The sheep and goat are both ed as beasts of burden, and the dog is of large ze, and, like the others, furnished with fine wool der the upper shaggy hair.

The word Himálaya is a Sanscrit word, com-unded of *hima*, 'cold, or frost, or snow,' and *aya*, 'abode.' (Wilson's 'Sanscrit Dict.') The semblance of the first part of the compound to e name of the Haemus (Balkan), to the Greek *eima* (χεῖμα), and the Latin *hiems*, is obvious. he Greek and Roman geographers were ac-ainted with this enormous mountain-range der the general name of *Imaus* or *Emodus*.

HIMANTOPUS, the generic name for the ng-Legged Plover, or Stilt. [PLOVERS.]

HIMERA, a city in Sicily, was founded by e Zanclæans of Mylæ in Sicily (Strab., vi. 272), and after existing for 240 years was destroyed by the Carthaginians, and its ornaments carried off. The inhabitants who survived established themselves at Thermæ, near the site of the ancient town (Cic., 'In Verr.,' ii. 35), and enriched their new abode with such works of art as they had saved from the wreck. Upon the capture of Carthage, Scipio restored to the people of Thermæ, of Gela, and other Sicilian towns, those monuments of art of which they had been plundered in their wars with Carthage. ('In Verr.,' iv. 33.)

HIMMEL, FRIEDRICH-HEINRICH, a German composer, the reputed son of Frederic William II., of Prussia, was born in the duchy of Brandenburg in 1765. He was intended for the church, and studied theology in the university of Halle, but became so skilful in music that the king encouraged him to pursue the art as a profession, and settled on him a pension. He chose Naumann as his guide, with whom he made such progress that in two years he produced the oratorio of 'Isacco.' He then travelled into Italy, and at Venice brought out a pastoral opera, 'Il Primo Navigatore.' In 1794 he succeeded Reichardt as kapellmeister at Berlin, and in the following year produced his 'Semiramide.' The operas on which his fame chiefly rests are 'Fanchon das Leiermädchen' (Fanchon the Lyremaiden), and 'Die Sylphen' (the Sylphs). His death took place at Berlin in 1804.

HINCMAR was born in France in 806. He was of a noble family, and nearly related to Bernard, count of Toulouse. At a very early age he was placed under the care of Hilduin, abbot of St. Denis. His talents and high birth brought him under the notice of the Emperor Lewis the Meek. Hilduin, having fallen under the displeasure of his royal master, was banished from the court, and retired to Saxony, accompanied by Hincmar. On the death of Hilduin, his successor Lewis again introduced him to the court of the emperor, who presented him with the government of the abbeys of Notre Dame at Compiègne and St. Germer. Ebbonius, archbishop of Rheims, having been deposed, Hincmar was elected by the clergy and people to succeed him.

In 857 Hincmar composed his first great work on Predestination, the preface of which is the only part extant. A few years afterwards he wrote a second treatise on the subject of Predestination, which has been preserved.

In the year 862, and for several succeeding years, we find Hincmar engaged in controversy with the Pope, to whose interference in temporal matters he offered a strong resistance. Some years after however, Hincmar exercised the same firmness in defending the rights of the church against the encroachments of regal authority that he had shown in opposing the Roman pontiff.

Hincmar died Dec. 21, 882, at Epernay, where he had gone to escape from the Normans, who were pillaging and overrunning the province. His works have been collected in two volumes folio by the learned Sirmond, Paris, 1645; and another volume was added to this collection by Cellot, in 1658.

HINDOO ARCHITECTURE. [HINDUSTAN.]

HINDUSTAN, that is, in the Persian language, the country of the Hindus, or Hindoos, is the name which has been adopted by geographers to designate that part of India, or the East Indies, formerly called the Peninsula within the Ganges, which extends from Cape Comorin to the Himalaya Mountains. As the long declivity of this extensive mountain-chain slopes towards the plains of Hindustan, the Himalaya Mountains are properly included in Hindustan. The seas which surround Hindustan on the S.E., S., and W., and the mountains which inclose it on the N.W. and N.E. mark distinctly its boundary on these sides. On the E., where the valleys traversed by the Brahmapootra and the Soormah open into the plains of Bengal, the boundary-line is uncertain; but we may fix it at 92° 30′ E. long. Within these boundaries Hindustan extends from Cape Comorin, 8° 4′ N. lat., to Attock on the Indus, 34° N. lat., and from Cape Monze, west of the delta of the Indus, 67° 30′ E. long., to the meridian of 92° 30′. Its length, N. to S., is about 1800 miles, and its greatest breadth, between Cape Monze and Silhet, along the parallel of 25° N. lat., is about 1500 miles. The area is about 1,000,000 square miles, or about nine times the area of Great Britain and Ireland.

The coast-line of Hindustan amounts, according to a rough calculation, to about 3280 miles, of which 1830 miles are washed by the Indian Ocean, and 1290 by the Bay of Bengal; about 160 miles, or somewhat more, extend along the Gulf of Manaar and the Palk Strait. Beginning with the innermost corner of the Bay of Bengal, to Chittagong, the coast for about 320 miles is traversed by the numerous mouths of the Ganges. Contiguous to the Hoogly branch of the Ganges is the open Bay of Balasore, with a coast of 120 miles, terminating at Cape Palmyras. From this point the coast stretches S.W. to the mouth of the Kistna, about 420 miles, and is without harbours, except that of Coringa, near the mouth of the Godavery. From the mouth of the Kistna, S. by W., to Cape Calymere, about 430 miles, no harbour occurs, even for vessels of moderate size. From Cape Calymere, W.S.W. to Cape Comorin, about 160 miles, there is only the small harbour of Tuticorin. The coast, which stretches N.N.W., and afterwards nearly N., between Cape Comorin and the innermost corner of the Gulf of Cambay, about 1150 miles, contains a great number of small and several very good and safe harbours. The coast-line of the peninsula of Gujerat, about 380 miles, has several harbours for vessels of moderate size. The coast-line of the island of Cutch extends about 150 miles. The coast intersected by the several mouths of the Indus extends as far as Cape Monze, about 150 miles, but it cannot be approached by vessels of more than 50 tons' burden, except at the harbour of Curachee, which admits vessels of moderate size.

Following what may be called the natural divisions of Hindustan, we shall distribute our description of it under the six following heads:—1, Southern Region, comprehending the southern extremity as far north as the Gap of Coimbatoor; 2, the Deccan, which extends to the river Nerbudda; 3, Mountain Region of North Hindustan, comprehending the terraces north of the Nerbudda, together with the peninsulas of Gujerat and Cutch; 4, the Plain of the Ganges; and 5, the Plain of the Indus. To these may be added the Himalaya Mountains. [HIMALAYA MOUNTAINS.]

I. *The Southern Region.*—The narrow sea which separates Hindustan from the island of Ceylon is traversed by a chain of islands and sand-banks called Adam's Bridge. [ADAM'S BRIDGE.] The island of Rameserum is low, sandy, and not cultivated, but celebrated for its great pagoda. The coast from Point Calymere to Cape Comorin is low and sandy, but at a short distance from the sea some sand-hills occur, between and behind which are numerous salt swamps and lagoons. Behind them the country rises very slowly to the foot of the mountains on the west. This tract is well cultivated, and presents a succession of rice-fields and palm-groves. Among its numerous rivers the chief is the Vaygaroo, which passes near the town of Madura, and falls into the sea not far from the Paumbeen Passage. *Madura* formerly contained a population of 40,000. It now contains only about 20,000, but its palace, great temple, and other edifices, are among the most magnificent in Hindustan. Farther south is the town of *Tinnevelly*, 60 miles N. by E. from Cape Comorin, in a well-cultivated country not far from the mountains.

The mountain-regions which border the plain on the west are little known, except that between 9° and 10° N. lat. they occupy a considerable surface, and some of the ridges rise to a height of 7000 or 8000 feet. This isolated mountain-region therefore may be considered as the highest land in Hindustan south of the Himalaya range. The Aligherry Mountains, S.W. of Madura, another offset of the same stock, rise to 4000 feet. South of 9° N. lat. the mountain-mass runs southwards in one single range, which is lower, and about 20 miles from Cape Comorin suddenly sinks to about 2000 feet. The remainder is a low ridge of granite overgrown with thick forests. Two passes are at present known to exist across these mountains. The country to the west of the mountains exhibits a much more diversified surface than that to the east of them. Numerous offsets consisting only of low hills advance towards the coast, and leave a level tract along the sea some miles broad. This tract, with its chain of lakes extending from Trivandrum to Cochin, is described under COCHIN. The country is subject to two native princes, allies of the English. The King of Travancore possesses the southern portion, which is about seven-eighths of the whole; and the Raja of Cochin is in possession of the northern portion. *Tivandrum*, the capital of Travancore, a few miles distant from the sea, is a large and well peopled place with a castle. *Anjengo* is a small harbour. *Quilon* has a small harbour, but a considerable population. The town of *Cochin* is described under COCHIN.

The Gap of Coimbatoor, or Ponany, which extends between 10° 40′ and 11° N. lat., is

long valley which unites the wide plains of the lower Cavery with the level coast of Malabar. It takes its name from the town of Coimbatoor, which lies near its eastern extremity, or from the river Ponany, which drains it in all its length. The most elevated part, near the sources of the Ponany, is only about 400 feet above the sea. Between Coimbatoor and the fortress of Palighat is the narrowest part of the valley, which is there only from 12 to 15 miles across. At the fortress of Palighat, the Ponany becomes navigable for canoes, and the culture of rice and other productions increases on the banks of the river as it advances towards its mouth, where the town of *Ponany* is built, which has a good harbour and a population of about 10,000.

II. *The Deccan.*—This term, derived from the Sanskrit Dakshina (the south), was originally applied to the whole peninsula south of the river Nerbudda, including also the country south of the Gap of Coimbatoor. It was afterwards used to indicate that portion of the peninsula which had become subject to the Mongol emperors. We here however apply it, in a geographical view, to the peninsula north of the Gap of Coimbatoor, and we fix its northern boundary at the valley of the Nerbudda, and thence eastward to the neighbourhood of Balasore, on the Gulf of Bengal. This boundary-line runs across the whole peninsula between 21° and 23° N. lat.

The interior and by far the greater part of this extensive region is an elevated table-land, which is inclosed on all sides by low plains extending to the sea-shore. The edges of the table-land are raised above the surface of the table-land itself, and appear in the form of mountains or high hills, and the descent from them to the low plains on the sea-shore is steep, and full of impediments to communication. The table-land extends from about 12° to 21° N. lat. Between 12° and 16° its average breadth probably does not exceed 150 miles, but north of 16° it widens gradually to 400 miles. By the natives it is called Bala-Ghaut, or the country above the Ghauts; and the low plains of the coast are named Payan-Ghaut, or the country below the Ghauts. The name Ghaut properly signifies a narrow pass through mountains, but is also applied to the mountain-ranges in which those passes occur. The elevation of this table-land varies. The country south of 15° N. lat., which is called the table-land of Mysore, is the highest part, and it is higher towards the east than towards the west. North of 15° N. lat. the table-land grows lower, and the greatest depression seems to occur between 15° and 17° in the region drained by the Kistna and its tributaries. The surface of this table-land is a level plain, on which hills rise here and there in a conical form, from 300 to 900 feet above their base. Towards the mountains which constitute the western edge of the table-land, numerous short spurs branch off from the mountains, and advance about 30 miles into the plain. The isolated hills, as well as these spurs, are of very steep ascent, and on them are built the numerous strong fortresses called droogs, or hill-forts, which are now mostly going rapidly to decay.

Here, as in other countries between the tropics, the year is divided into two parts, a rainy and a dry season. The rainy season occurs during the south-west monsoon, commencing in May, when only small showers fall. In June or July the showers become more regular and continuous, and they last till October. But the quantity of rain is not great, being estimated to amount only to 20 or 26 inches annually, whilst on the western coast it is 116 inches, and on the eastern 45 inches. The mean annual temperature of the higher districts of the table-land seems to be nearly 10° less than at Madras: it is stated to be at Darwar 75° Fahr., and at Madras 84° Fahr.

The table-land is destitute of trees so far as the plain extends. On the low spurs of the Western Ghauts and in the valleys between them the country is wooded. On the whole surface of the table-land a black soil prevails, which is favourable to the growth of cotton. The hills on the table-land are bare and sterile, as are also most of the small valleys between them, but some of the valleys are very fertile. The northern districts of the table-land are less fertile than the southern, and vast tracts without cultivation frequently occur there. During the rainy season and the cool months which immediately follow, this country is covered with a fine sward of grass, and is mostly cultivated or planted; but towards the spring the plains lose their verdure, and their surface becomes a brown level, intersected by numerous rents. Clouds of dust are raised by the dry winds, and the heat is excessive. The rivers flow slowly in their deep beds, and all the smaller streams dry up. The cultivation of rice is only carried on where there are artificial means of irrigation, and tanks for this purpose are numerous in some places. The number of other grains, plants, and fruits is very great.

By far the greatest portion of this table-land is still under the sway either of Hindu or of Mohammedan princes.

1. The most southern part is the kingdom of Mysore, governed by a Hindu prince. The capital is Mysore, south of Seringapatam. [MYSORE.] Two large towns carry on a considerable commerce. [BANGALORE; BEDNORE.]

2. The territories of the Nizam, or Raja of Hydrabad, a Mohammedan prince, occupy the centre of the northern portion of the table-land. The capital is *Hydrabad*, a large town, with a population of about 120,000. In its neighbourhood is Golconda, a fortress on a high hill, from which the whole country once received the name of the kingdom of Golconda. Other remarkable places are *Beder*, a commercial town, situated on one of the great thoroughfares of the table land, AURUNGABAD, DOWLETABAD, and *Ellora*, famous for its ruined cavern-temples.

3. The possessions of the Raja of Berar, or Raja of Nagpoor, as he is now more commonly called, extend to the east of Golconda. The capital is Nagpoor, situated towards the northern boundary of the table-land. [NAGPOOR.] The prince is a Hindu of a Mahratta family.

4. The territory of the Raja of Satara, who died recently, and which is at present under the

government of the British authorities, extends along the Western Ghauts, but reaches far into the table-land. The prince was a Hindu. The capital is SATARA, situated in a very fertile and well-cultivated country. In this territory is the ancient town of BEJAPOOR.

5. The territory of the Raja of Colapoor extends likewise along the Western Ghauts, south of the territories of the Raja of Satara. The prince is a Hindu. The capital is COLAPOOR.

6. The English possessions are partly annexed to the government of Madras and partly to that of Bombay. Only the Ceded Districts, or Balaghauts, belong to Madras. Two districts are annexed to the presidency of Bombay, viz. Darwar, and the Deccan, the first lying south of the territories of the rajas of Colapoor and Satara, and the second lying north of it. In Darwar is the town of *Darwar*, and in the Deccan are the towns of POONAH, AHMEDNUGGUR, and *Nassuck*, which has 27,000 inhabitants.

Of the higher lands which encircle the table-land the most northern portion is the elevated table-land of Omercuntuc, which lies between 22° and 23° N. lat. and 80° 30′ and 82° 30′ E. long. It rises considerably above the surrounding tracts, but its elevation is not known. On its eastern declivity rises the Sone River, and the Nerbudda traverses it in its length from east to west, until it leaves it near Mundlah. The table-land of Omercuntuc is the central link by which the higher lands of the Deccan are united to those which extend to the north of the Nerbudda. Below Mundlah the high lands contiguous to the table-land extend westward on both sides of the narrow valley of the Nerbudda in extensive masses, which, near 79° E. long., take the form of three distinct ranges. The most northern range is the Vindhya Mountains, the middle range is the Sautpoora Mountains, and the southern has no general name, but may be called the Northern Ghauts. Between these three ranges lie the two parallel valleys of the Nerbudda and Tapty.

The Northern Ghauts begin about 22° N. lat., between 78° and 79° E. long., with the high lands on whose western declivity the upper branches of the Tapty rise, and extend S.W. to near the fortress of Gawulgur, where the elevation is about 4000 feet. The remainder of the Northern Ghauts lies in a general westerly direction along the southern side of the valley of the Tapty, and joins the Western Ghauts west of 74° E. long.

The Western Ghauts, which constitute the boundary of the table-land of the Deccan towards the Indian Ocean, begin about 10 miles from the southern bank of the Tapty, and about 60 miles from the sea-shore. They run from N. to S. nearly parallel with the coast, generally at a distance of from 20 to 30 miles, but sometimes coming close to the shore. The range terminates a little south of the parallel of Calicut, about 11° N. lat., where they constitute the northern border of the Gap of Coimbatoor. This range varies considerably in elevation. North of Bombay it is stated not to exceed 3000 feet in height, and to be only about 1000 feet above the table-land on the east. South of Bombay it rises higher, and about 18° N. lat., has an elevation of about 5000 feet. Opposite Goa (15° 30′) the mountains are traversed by a pass which is only 2477 feet high, and hardly more elevated than the contiguous plains of Darwar. Opposite Bednore (south of 14° N. lat.) the mountains rise to 4000 feet, and they seem to continue with this elevation to 13° 42′, south of which they rise to between 5000 and 6000 feet in the Alpine region of Coorg, and at their termination they probably are not much lower. The width of the Western Ghauts is inconsiderable, and, if the spurs be excluded, perhaps nowhere except towards its southern extremity exceeds 12 miles.

The rapidity with which the Western Ghauts descend to the sea renders it very difficult to ascend the table-land of the Deccan on this side. The mountain-passes, or ghauts, are not numerous, and most of them are not passable for beasts of burden. One of the most frequented is the Hosso Angady Ghaut, which keeps up the commercial communication between Bednore and Mangalore.

The Western Ghauts are entirely covered with thick forests of tall trees, except in a few places where the rocky masses are too steep to permit any accumulation of earth. Many of the trees are very valuable, especially the teak, which during the rainy season, when the numerous streams acquire a great volume of water, is floated down to the several harbours on the coast, especially to Mangalore, and thence to the other ports of Hindustan.

The whole of the narrow coast which intervenes between the Western Ghauts and the Indian Sea is sometimes comprehended under the name of Malabar. But properly the northern part of it, as far south as 15° N. lat., is called the Concan; the middle part, between 15° N. lat. and 12° 3′, Canara; and only the southern part, as far as Cape Comorin, is properly named Malabar. The level tract along the sea-shore is covered with sand, and overgrown with cocoa-palms; but near the termination of the hills the soil is better, and produces rich crops of rice, for which no artificial irrigation is required, the ground being saturated by the abundant rains. The sugar-cane is also cultivated. Cattle and buffaloes are the only domestic animals, and both are distinguished by their size. Wild elephants are numerous; and also tigers, leopards, hyænas, and jackals.

The whole of this maritime tract, as far south as 10° 45′, is now in possession of the British government, with the exception of that portion which lies between 15° and 16°, which comprises the Portuguese territory of Goa and town of Damaun, the territory of the Raja of Sawunt Warree, and the small town of Mahé, which is in the possession of the French. The English possessions north of 16° N. lat. are annexed to the presidency of Bombay, and those south of 15° to that of Madras. *Damaun*, the Portuguese settlement (20° 22′ N. lat.), has lost much of its commerce since the rise of Bombay. It lies nearly halfway between Surat and Bombay, and has a safe harbour for vessels of small size. Farthe

south is Bombay. *Goa*, the Portuguese settlement, is situated on an island about 24 miles in circumference, formed by the river Mandova, and stands in 15° 30′ N. lat., and 73° 58′ E. long. The ancient city, which is now deserted by all its inhabitants, with the exception of a few miserable ecclesiastics, was once a splendid and populous place. The new town, to which the name of Panjim has been given, stands five miles nearer the sea than the ancient city. It is well built, and has from 18,000 to 20,000 inhabitants. *Mangalore* (12° 50′ N. lat.), which is built on the banks of a salt lake, into which several rivers discharge their water, was destroyed by Tippoo in 1784, but has risen again since it came into the hands of the English. Ships drawing less than 10 feet water can enter the harbour at high tides. The town is thriving, and contains about 40,000 inhabitants. *Cananore* (11° 52′ N. lat.) is built at the bottom of a small lake, which is one of the best harbours on this coast. It contains about 10,000 inhabitants. *Tellicherry* (11° 44′ N. lat.), was formerly the chief settlement of the English on the coast of Malabar, but has since been neglected; it contains about 5000 inhabitants. *Mahé* (11° 42′ N. lat.), the only French settlement on this coast, has a harbour for small vessels, and about 6000 inhabitants. It principally exports pepper. Farther south is the town of Calicut. [Calicut.]

The mountain-ranges which support the table-land of the Deccan on the south were scarcely known till within the last thirty years. They cover by far the greatest part of the space contained between 11° and 12° N. lat., and 76° and 79° E. long. The western portion is occupied by the Nilgherry Mountains, which are well known to Europeans resident in India as affording them the climate and productions of Europe at a distance of only 11 degrees from the equator. These mountains are connected with the southern extremity of the Western Ghauts; they extend between 76° 26′ and 77° 20′ E. long., and between 11° 10′ and 11° 35′ N. lat., so that their length from west to east is more than 60 miles, and their width about 30 miles. All this space is occupied by one mass of high land, unbroken by ravines or deep valleys. The elevation is from 5000 to 6000 feet. Through the centre of this region there runs a more elevated ridge, the highest part of which has an elevation of about 8000 feet. The surface of this region is a fertile soil, overgrown, where it is not cultivated, with a green sward of grass and several kinds of alpine herbs. The excellent climate on these heights has led to the establishment of several sanatory stations, in which Europeans may re-establish their health when impaired by a long residence in the hot countries. The mean annual temperature at Utakamund, one of the highest of these stations, is 56° Fahr., and consequently 28° less than at Madras. The fruit-trees of England succeed everywhere, and are frequently seen covered with blossoms and fruits in all stages at the same time. Oranges grow only in the lower districts. Game abounds everywhere. To the south this hilly table-land descends with a deep slope to the Gap of Coimbatoor. The deep valley through which the small river Moyar runs along its northern side separates it from the table-land of Mysore. The slopes on all sides are wooded, and it is only here that the animals of the tropical regions, as tigers, leopards, and elephants, are found.

North-east of the Nilgherry Mountains is another mountain-mass, which occupies nearly the whole space between the Cavery and the Bhovany, an affluent of the Cavery, as far W. as 77° E. long. Very little is known of these mountains, which occupy more than twice the space of the Nilgherry Mountains.

The river Cavery, after passing by Seringapatam, breaks through these southern mountain-masses. [Cavery.] The delta of the Cavery and the level country along its lower course in the plain lie in the parallel of the Gap of Coimbatoor, which may be considered as a prolongation of the plain to the Indian Ocean.

The countries extending along these mountain-ranges and the lower course of the Cavery constitute a portion of the Carnatic, the principal division of the presidency of Madras. The following are the most remarkable places:—Coimbatoor; Trichinopoli; Tanjore. *Negapatam*, formerly a Portuguese and afterwards a Dutch settlement of importance, has lost its trade since it was united to the British dominions (1783). *Carrical*, a French settlement, built at one of the outlets of the Cavery, which is navigable for small river-boats, has a harbour, considerable commerce, and 15,000 inhabitants. *Tranquebar*, formerly a Danish settlement, has a harbour, some commerce, and about 20,000 inhabitants.

The Eastern Ghauts, which separate the table-land of the Deccan from the low and level country extending along the Bay of Bengal, between 12° and 18° N. lat., occupy in width a much larger space than the Western Ghauts. South of 13° 10′ N. lat., where their longitudinal direction is S.S.W. and N.N.E., their average breadth is not less than fifty miles. Between 13° 30′ and 16° N. lat., where they are called the Nella Malla Mountains, and, lying in a general northern direction, occupying the whole space between 78° and 79° E. long., they are probably nearly 80 miles across. Between 16° and 18′ N. lat. they run S.W. and N.E., and here their breadth is probably somewhat less. These mountains consist of a number of mountain-ridges running parallel to one another in their general direction. Their elevation has not been ascertained, but is supposed to vary in different portions from 3000 to 6000 feet. The surface of the whole region is very stony, dry, and exceedingly broken, presents very few spots fit for agricultural purposes, and is also nearly destitute of trees, with the exception of a few tracts covered with wild date-trees.

Three rivers, originating on the table-land, pass through this mountain-region in transverse valleys so narrow that they are, properly speaking, mere clefts. The most southern is the *Pannair*, which runs about 250 miles, and falls into the sea near Cuddalore. The *Palair*, passing by Arcot, flows about 220 miles, and falls into the sea in 12° 28′ N. lat. The most northern of these

rivers is the *Pennair*, whose course extends to 280 miles, and which falls into the sea not far from Nellore, in 14° 35′ N. lat. Though its course is long, it brings down a comparatively small volume of water, and is of little use for irrigating the low-lands, whilst the Pannair and Palair fertilise the whole of the countries which they traverse.

The mountain-passes through this region are as difficult as those over the Western Ghauts. They are very little visited, and are nearly unknown, except the great military road which leads from Madras to the table-land.

The country which separates the Eastern Ghauts from the Bay of Bengal, and comprehends the central and northern Carnatic, with the Guntoor Circar, has a low sandy beach, from which the surface rises gradually, but slowly, to the foot of the mountains. The soil in some parts is very fertile when irrigated, which is partly done by canals from the rivers, and partly by numerous tanks. Along the sea-coast the country is less fertile, but produces good crops of rice when the rainy season has been abundant. Millet, maize, cotton, and indigo are also raised, and sugar is cultivated in small quantities. The Lake of Pulicat, north of Madras, appears to owe its existence to the sea breaking through a low sandy beach, and overflowing the land within. It extends 33 miles N. to S., and is 11 miles across in the broadest part. It contains several large islands. It communicates with the sea at three points, but the outlets are extremely narrow and shallow.

The rainy season is later here than on the western coast of the Deccan. The annual quantity of rain at Madras is about 48 inches. The climate of the Carnatic is very hot. Its mean annual heat is stated to be between 82° and 84° Fahr. On the coast the heat is somewhat mitigated by the sea-breeze, which sets in between ten and eleven o'clock, but it sometimes fails altogether, and then the thermometer rises to 130° in the shade.

The Carnatic, or the low country extending from Cape Comorin to the river Kistna, constitutes the main body of the presidency of Madras. The whole country is now under the dominion of the British, except the French settlements at *Carrical* and PONDICHERRY, the Danes having sold their settlement at Tranquebar to the British government. The towns are MADRAS, ARCOT, CONJEVERAM, and CUDDALORE.

The river *Kistna* originates on the eastern declivity of the Western Ghauts. All the waters collected on the eastern side of that range, between 13° and 19° N. lat., unite successively in its channel. The source of the river is near 18° N. lat., between Poonah and Satara. It runs for more than 100 miles S.S.E., receiving numerous small streams from the west. Afterwards it flows S.E., and its waters are increased by the two rivers Gatpurba and Malpurba. The remainder of its course on the table-land is nearly E., with some great bends towards the N. and S. Here it receives from the north the Beema, which has a winding course through the table-land of probably more than 300 miles. Where the Kistna approaches the Nella Malla Mountains, it is joined from the south by the Toongabudra, whose upper branches, the Toonga and the Budra, originate near 13° N. lat. Below Condapilly the Kistna flows S.S.E. through a low plain, in which it divides into several arms, embracing a small delta. Its whole course is about 650 miles. On the table-land, as well as in the low plain, the surface of the water is from 20 to 30 feet below the adjacent land, and consequently it cannot be used to irrigate the fields. The Kistna brings down a comparatively small volume of water, and is not navigable in any part.

The mountain-region between the Kistna and Godavery, which separates the table-land of the Deccan from the low tract along the coast, occupies nearly 60 miles from W. to E. The character of this region is little known.

The low country between the lower course of the rivers Kistna and Godavery comprehends the Circar districts of Condapilly and Ellore, and resembles the delta of the Nile, though somewhat smaller. A considerable portion of it is annually inundated by the Lake of Colair, which is a fresh-water lake, situated in a deep depression, nearly in the centre of the low tract. This lake is about 24 miles long, and half as wide in the broadest part, and is connected with the Godavery and Kistna by channels which in the dry season contain no water, but from July to September convey a portion of the water of these rivers to the lake, which is then filled, when it becomes from 40 to 50 miles long, and inundates the adjacent country. The lake covers 200 square miles, and contains fifteen islands. The superfluous water is carried off by the river Oopatair, in which the tides ascend to the lake, but are prevented from entering it by embankments. This river is navigable for small vessels. This tract contains the large town of MASULIPATAM.

The *Godavery*, the largest river of the Deccan, rises in the most north-western corner of the table-land, north of 20° N. lat., and about 60 miles from the Indian Ocean. It flows about 150 miles E.S.E. without receiving any great tributary; it then winds through the plain in a general eastern direction for 250 miles more, and in this space it is joined by the Manjera from the south, and by the Poorna and Whurdha from the north. The Whurdha is a considerable river, which, together with its tributaries, drains a great extent of country. After this junction the Godavery is a mile wide, but at the end of the dry season it has only 15 inches of water. It then passes through the mountain-region, and, having entered the low country, becomes 4 miles wide, and has a great volume of water, but soon divides into two branches, which include a small delta. Where it approaches the sea it divides into many more branches, in which the tide ascends to some distance, and which admit vessels of considerable burden. On the most northern of these arms is *Coringa*, the only harbour on the coast between Cape Comorin and the Hoogly which has smooth water during the south-west monsoon. The course of the river Godavery exceeds 700 miles.

The north-eastern portion of the Deccan, ex-

tending along the Bay of Bengal, between the mouth of the Godavery and the Bay of Balasore, and from that coast westward into the interior, contains several mountain-ranges which are little known. The inhabitants of this tract of mountainous country are called Gonds, and the country is called from them Gondwarra or Gondwana. The British government and the Raja of Berar are the rulers of this country in nearly equal parts, but the authority of both is only nominal. The low tract however along the sea-coast which skirts Gondwarra on the east belongs to the British, and is annexed to the presidency of Madras.

From about 20° 10′ N. lat. to about 22° 20′ extends the plain of Ruttenpoor, which is very fertile and is well irrigated by rivers.

The *Mahanuddy*, whose upper branches drain this plain, receives its principal supply of water from the unknown mountain-region of Gondwarra. At Sumbhulpoor, where it is a mile across, it turns S., but from the junction with the Kobragur to the sea its course is E. At Cuttack, where it is two miles across, it enters a level plain, which is fertilised by its waters. Below Cuttack it divides into three branches, one of which, called the Cajori, runs S., and passes near the temple of Juggurnaut. The main body of the river, called Chittertola, continues E. to the sea; and the northern arm, named Beroopa, runs N.E. until it joins the Braminy, and then runs E. to the sea, near Cape Palmyras. The whole course of the Mahanuddy is estimated at 500 miles. It is navigable for small vessels as far as Sumbhulpoor, and for river-boats to the mouth of its tributary the Hoostu, a distance of 380 miles.

The delta of the Mahanuddy extends along the sea from the lake of Chilka (19° 40′ N. lat.) to the town of Balasore (21° 30′ N. lat.). The lake of Chilka, which forms the boundary between the Circars and the province of Cuttack, is about 35 miles long and 8 miles wide on an average. It is divided from the Bay of Bengal by a low and sandy tract, which is less than half a mile across. Its mean depth is only from 4 to 5 feet. A great quantity of salt is prepared from the water of the lake by evaporation. The delta of the Mahanuddy is occupied along the shore by a swampy tract, overgrown with jungle and low bushes, among which few trees rise to a great height. This tract, which extends from 5 to 20 miles inland, is more the habitation of tigers, leopards, wild buffaloes, and crocodiles, than of men. Great quantities of salt, of the finest quality, are made here. South of the Chilka Lake the soil is sandy and destitute of trees. Contiguous to the woody tract, but farther inland, lies the fertile portion of the delta, which is generally only from 10 to 15 miles across, but in some places 30 or 40 miles. It produces, when irrigated, abundant crops of rice, sugar, and tobacco, and in the less fertile tract millet is raised. The chief town is CUTTACK. It forms, with the adjacent mountainous country, the province of Orissa, which is annexed to the presidency of Bengal.

N.W. of the delta of the Mahanuddy there spreads out an extensive mountain-region, of which the southern declivity forms part of the Deccan, while the northern belongs to the mountain-region of Northern Hindustan. The Vindhya Mountains branch off from it on the west. At its most eastern extremity a range projects from it towards the Bay of Bengal, where it terminates W.S.W. of Balasore, under the name of the Nelligreen Mountains.

The table-land of the Deccan is separated from the mountain-region of Northern Hindustan by the valleys of the parallel rivers Tapty and Nerbudda.

The *Tapty* rises in a mountain-tract which joins the table-land of Omercuntuc on the south-west, with two branches, the Tapty and the Poorna, the former running W.S.W. and the second W., till they unite, after a course of about 150 miles, near 76° E. long. After the junction of the upper branches the Tapty flows in a wide valley between the Sautpoora Mountains on the north, and the Northern Ghauts on the south, for about 280 miles, until it enters the Indian Ocean by a wide æstuary below the town of Surat.

The *Nerbudda* rises on the table-land of Omercuntuc. After passing the town of Mundlah, it runs in a narrow valley and between masses of rocks with a rapid course past Jubbulpoor. Farther west the valley grows wide, and the river has a less rapid course. It then arrives at Hoshungabad, where it is 900 yards wide and from five to six feet deep, so as to become navigable for small vessels. It continues to be navigable as far west as ten miles below Chiculdah, where the river is narrowed to 200 yards, and basalt rocks lie across its bed. The water of the river rushes with great violence through three openings. Farther downwards the river is still more narrowed by the rocks, and becomes entirely unfit for navigation for a great distance; but about 10 miles above Tulluckwarra it enters the low lands of Gujerat, and is navigable from this place to its mouth for river-boats, a distance of about 90 miles, and for vessels of moderate size half that distance. Below the town of Baroach it forms a wide æstuary. The whole course of the river is about 600 miles.

The valley of the Nerbudda extends mostly along the southern banks of the river, since the Vindhya Mountains, which inclose it on the north, often advance to the banks of the river or very near them. The upper part of the valley from Mundlah to Hoshungabad is comparatively narrow. S. of Hoshungabad, at the sources of the Tapty, the mountains take the form of a continuous chain, called the Sautpoora Mountains. This chain at its commencement runs nearly S.W., but by degrees turns W., and continues nearly parallel to the Vindhya Mountains, until it approaches that range at about 76° E. long., but afterwards it resumes its western direction. These mountains are not very high, their mean elevation towards the east not exceeding 3000 feet, and farther westward they are somewhat lower. The most considerable places in the valley of the Nerbudda are *Jubbulpoor*, 1458 feet above the sea; *Hoshungabad*, a large town with good buildings, and an important place for the communication between the plain of the Ganges and the western countries of the Deccan; *Mundleysir*, or *Mundlesir*, which,

though not large, is an important place, because the most frequented pass leads from it northward over the Vindhya Mountains to Oujein; *Mhegsir*, a little farther west, a large place, with good buildings; and *Burwanee*, which contains many good buildings and a large palace.

The upper portion of the valleys of the Tapty and Nerbudda is subject to the British, and is named the Ceded Districts on the Nerbudda. The western districts on both rivers belong also to the British, with the exception of a tract in the middle, which is subject to the Guicowar. The British possessions in this part are annexed to the presidency of Bombay, forming a portion of the district of Candeish. The country between Allahabad and the presidency of Bombay is partly subject to Sindia, Holkar, and other Mahratta chiefs.

III.—*The Mountain Region of Northern Hindustan* has nearly the form of a triangle, whose base is formed by the Vindhya Mountains, skirting the vale of the river Nerbudda on the N., and whose apex is at Rewarree, at no great distance from Delhi, on the Jumna, to the S.W. It contains a table-land of considerable extent, that of Malwa which occupies its southern portion, and is everywhere inclosed by mountain ranges, and also a mountain-region, called Uppermal, which extends on the north of the table-land. To these two extensive portions are to be added the peninsula of Gujerat and the island of Cutch.

The Vindhya Mountains begin on the W., near 74° E. long., and 22° 10′ N. lat., about 10 or 15 miles from the northern banks of the Nerbudda. East of Chiculdah (near 75° E. long.) the range approaches the river Nerbudda, and continues along it like a steep wall, with a broad-backed surface and without summits. On the average it is about 1700 feet above the vale of the Nerbudda, and hardly more than 2200 feet above the level of the sea. That portion only of the range which extends E. to the road which connects the town of Bhopal with that of Hoshungabad is called the Vindhya Mountains by the natives. But the range continues east of the road, is connected with the table-land of Omercuntuc (between 80° and 81° E. long.), and occupies farther east the greatest part of the tract between the Ganges and the river Sone; it terminates on the banks of the Sone between Rotasghur and Sasseram, near 84° E. long. This more eastern portion of the Vindhya Mountains is called by the natives the Kimoor Mountains. The roads leading over the Vindhya Mountains are few.

Another range extends from the Kimoor Mountains E. and N.E., called the Goomah Ghauts, and unites with the Rajmahal Hills, which terminate near Rajmahal, on the banks of the Ganges.

The table-land of Malwa has the Vindhya Mountains for its southern boundary. On the north it is inclosed by a chain of mountains, which Ritter names the Harraouttee range. The table-land of Malwa extends from Dohud on the W. (near 74° 20′ E. long.) to Bhopal on the E. (77° 20′ E. long.), about 170 miles, and its average width from S. to N. may be about 80 miles; its area consequently may be estimated at

13,600 square miles. Malwa is a plain, gently inclined towards the north, with an elevation varying between 2000 and 1300 feet. Its soil is a black loam, producing rich crops of rice, Indian corn, peas, beans, &c. Large quantities of sugar-cane, tobacco, cotton, and linseed are also raised and exported. But the most important of its productions is opium, of which a very large quantity is annually raised.

On this table-land are several towns of importance. Near the Vindhya Mountains is *Bhopal*, a large town, situated on one of the great roads which traverse this part of Hindustan. *Indore*, likewise near the Vindhya Mountains, is the residence of the Mahratta prince Holkar. *Dhar*, once a very large place, has still a population of 30,000. Nearly in the centre of Malwa is *Oujein*, a very ancient town. It was formerly the residence of Maharaja Scindia, is well built, full of temples and other buildings, and contains 150,000 inhabitants. *Bhampoor*, on the river Chumbul, nearly opposite Rampoor, is a place of great commerce, being situated on a pass which leads over the Harraouttee Mountains to Uppermal.

West of the meridian of 73° 30′ E. long. lies the plain of Gujerat, with an average breadth of about 45 miles, extending southward to the banks of the Tapty at Surat, and northward to the river Saubermutti, which enters the most northern corner of the Gulf of Cambay. It is one of the richest and most populous countries of Hindustan, having a good soil, and receiving the heavy rains brought on by the south-western monsoon. It is also well watered, though some of its rivers, especially the Mhye, have furrowed out very deep beds. Rice is nearly the only grain which is cultivated; but the numerous villages are surrounded by extensive plantations of cocoa, mango, and other fruit-trees. The number of large towns is considerable. [AHMEDABAD; BAROACH; BARODA; CAMBAY.]

The Gulf of Cambay, which divides the plain of Gujerat from the peninsula of Gujerat, is very difficult of navigation. The violence with which the spring-tides enter and run up the gulf is equal to that of the bore in the Ganges at Calcutta. This gulf extends in length about 72 miles, but its width varies between 32 and 8 miles.

At the most northern corner of the Gulf of Cambay lies a very flat tract, covered with an alluvial soil, which continues in a north-western direction until it meets that part of the Runn which forms the interior of the Gulf of Cutch. It may be considered as a continuation of the Runn, and connects the peninsula of Gujerat with the plain of Gujerat.

The peninsula of Gujerat is separated by the Gulf of Cutch from the island of Cutch, and by the Gulf of Cambay from the plain of Gujerat. The greatest part of it is covered with mountains and hills, but a fertile plain extends along its northern shores from 15 to 20 miles inland, and the flat swampy tract along its eastern border continues along the Gulf of Cambay as far south as Nowanuggar. The whole of the peninsula is well watered, and the rivers, with the exception of those which fall into the Gulf of Cutch, preserve

their water all the year round. The best cultivated district is the northern plain, where the common grains of Hindustan are raised in abundance, together with cotton. The principal commercial town, *Nowannuggur*, on the Gulf of Cutch, carries on a considerable commerce with Arabia and the Persian Gulf. It is a large place, and has good manufactures of cotton. The climate of Gujerat is rather mild, and not unhealthy even for Europeans. At the most southern point of Gujerat the Portuguese are in possession of the small island of *Diu*, where there is a good harbour and a fort erected for its protection. It was formerly a considerable place, but has now little commerce.

Gujerat is partly subject to the British, and partly to the Guicowar, of whom an account is given under BARODA, where he resides.

The Gulf of Cutch, which lies between the peninsula of Gujerat and the island of Cutch, grows more shallow as it proceeds east. Large vessels can sail up to Nowannuggur, and small ones to Jooria. The island of Cutch is only an island during the rainy season of the south-western monsoon, when the Runn inclosing it on the northern side is covered with water.

Cutch lies between 22° and 25° N. lat., and between 68° and 72° E. long. It extends E. to W. about 140 miles; its greatest width is about 60 miles, but in some places not more than 12 miles. Two ranges of low mountains traverse the island in a W.N.W. and E.S.E. direction from one extremity to the other. The valleys between these two ranges constitute, with the southern plain, the cultivable portions of the island. From the northern side of the main body of the island a remarkable tongue of land projects far into the Runn. It is about 60 miles long, but not more than 10 miles wide on an average. It is called the Bhunnee. Its surface is somewhat raised above the level of the Runn, but can only be used as pasture-ground for numerous herds of buffaloes and cattle; and the produce of their dairies, the ghee, is one of the most important articles of export from Cutch. The three islands situated within the Runn, Puchum, Khureer, and Charar, are of the same description. The climate of this island, which is traversed by the tropic of Cancer, and is near the rainless region of the globe, is very dry and hot.

The principal towns of Cutch are, Anjar, Bhooj, the capital, and Mandavee. [ANJAR.] *Bhooj* is 23° 18′ N. lat., and 69° 50′ E. long. The fortifications are extensive, but badly planned. The town contains several mosques and pagodas of white masonry, interspersed with plantations of date trees, but a large portion of the houses are mean. The palace of the Rao is a large and well built structure, covered with a kind of white enamel, which gives it a very handsome appearance. The population is about 20,000. *Mandavee*, the principal sea-port of Cutch, is situated on the shore of the Indian Ocean on the north side of the entrance to the Gulf of Cutch, in 22° 51′ N. lat., and 69° 34′ E. long. Mandavee is the most populous place in the principality, and contains 50,000 inhabitants, who are principally Bhattias, Banyans, and Brahmins: there are but few Mohammedans. The port is an open roadstead with a creek. A good trade is carried on with Zanguebar and the whole east coast of Africa, with the Red Sea and Arabia, with the Persian Gulf, Mekran, and Sinde, and with India as far as Ceylon.

The population of Cutch is estimated to amount to 400,000, about one-half of whom are Mohammedans, and the greater part of the remaining half Hindus. Cutch is governed by a prince of Hindu race, whose title is Rao.

On the north side of the table land of Malwa, and separated from it only by the Harraouttee Mountains, lies a mountain-region called by the natives Uppermal, or mountainous country. Its western boundary is well defined, and protected by the Aravulli range. [ARAVULLI.] The country between this range, the Harraouttee Mountains, and the Kimoor division of the Vindhya Mountains, is traversed by several ridges running nearly parallel to the Aravulli Mountains. This country occupies nearly double the area of the table-land of Malwa.

The Chitore Mountains are nearest to the Aravulli, with whose southern extremity they are united by a kind of mountain-knot, in which the Harraouttee range also terminates on the west. They run in a N.E. direction towards Agra on the Jumna, where they terminate in the plain of the Ganges, about 30 miles from the banks of the Jumna. They are of inconsiderable elevation, being only about 600 feet above their base, and 2000 feet above the sea-level.

The country between the Chitore Mountains and the Aravulli forms a portion of Rajpootana. [RAJPOOTANA.]

The country S.E. of the Chitore Mountains, and between them and the Vindhya range, is known in its western districts by the name of Harraouttee, and in the eastern by that of Bundelcund. It is a succession of narrow valleys, separated from one another by broad-backed ranges, which, in their upper parts, extend in uneven plains. On the table-land of Pannah, between the Cane and Tonsa rivers, is the town of *Pannah*, a well-built place, perhaps 1800 feet above the sea, the neighbourhood of which contains the richest diamond-mines in Hindustan. North of Pannah, on the banks of the river Cane, is the town of *Bandah*, which is well built, and carries on a considerable commerce, especially in the cotton from the valley south of it. The fortress of *Gwalior*, situated where the mountain-region borders on the plain of the Ganges, is built on a rock, having a tolerably level surface of considerable extent, and a steep descent on all sides. At the foot of the rock is the town of Gwalior, which contains 30,000 inhabitants. On the right bank of the Chumbul, in a very mountainous country, is the town of *Kotah*, the residence of the Raja of Kotah.

All the rivers which traverse the table-land of Malwa and the mountain-region of Uppermal fall into the Jumna or the Ganges, their course being N.E. The largest is the *Chumbul*, which originates on the northern declivity of the Vindhya Mountains, in three branches, between which the

towns of Dhar, Sagore, and Indore are built. It receives a great portion of the drainage of the table-land, and enters the Harraouttee range between Rampoor and Bhampoor. In the plain below Kotah it is joined by other rivers. The Chumbul begins to be navigable only a short distance above its junction with the Jumna, which takes place between the towns of Etawah and Calpee, after a course of about 400 miles. The *Sone* rises on the eastern declivity of the table-land of Omercuntuc, south of 23° N. lat., and near 82° E. long. It joins the Ganges above Patna.

The mountain-region of Northern Hindustan is for the most part in the possession of native princes. The British have however annexed the countries south of the Sone to the presidency of Bengal, and the tract between the Sone and the Ganges to the North-Western Provinces. Between the territories of Calcutta and Allahabad the possessions of the Raja of Rewah are inclosed, which comprehend a tract of mountainous country on the Upper Sone and on the Tonsa. The remainder is divided among the Mahratta princes, Sindia, Holkar, the Guicowar, and the Rajpoots. [SINDIA; HOLKAR; RAJPOOTANA.]

IV. *The Plain of the Ganges.*—The *Ganges*, or *Ganga*, rises with its two principal branches in the highest elevation of the Himalaya Mountains, near 31° N. lat., and between 78° 30′ and 80° E. long. The most western branch is called Bhaghirettee. The other branch is called the Alakananda. The river formed by the junction of the Bhaghirettee and Alakananda is called the Ganges. Its course within the region of the Himalaya Mountains is not long, but very winding, until it entirely leaves it below Hurdwar, and enters the plain of the Ganges. The surface of the river at this point is hardly more than 1000 feet above the sea-level. The length of its course, including the Alakananda as the longer branch, does not fall short of 150 miles. In the plain it continues its course for a considerable distance S. until it begins to decline imperceptibly to the S.S.E., in which direction it flows to its junction with the Jumna at Allahabad. In this part of its course, of more than 400 miles, it receives no considerable affluent, except the Ram Ganga. The *Jumna*, which joins the Ganges at Allahabad, rises west of the Ganges within the more elevated masses of the Himalaya range in two branches. They unite near Kalsi, within the lower range of the Himalaya, and soon afterwards leave the mountain region. In the plain the surface of the river is about 1200 feet above the sea-level. Its course is parallel to that of the Ganges. By degrees it approaches nearer to that river until it joins it at Allahabad. Though its waters during its course are increased by those of the Chumbul, and other rivers of the mountain-region of Northern India, yet at the point of their confluence the Ganges is much larger, being a mile across, while the Jumna is only 1400 yards.

From Allahabad to below Boglipoor, situated at the foot of the Rajmahal Hills, the Ganges runs with a winding course eastward, and in this part of its course it receives a great number of large streams, among which may be mentioned the

Goomtee, the Gogra, the Ghandaki Ganga, or Gunduck, the Bugmutty, and the Coosy. At Sicligully, about 30 miles below Boglipoor and 10 miles above Rajmahal, the Ganges, having passed the hills, which here approach its bed, turns southward, and here the great delta of the river may be considered to begin. Though it does not at present divide at this place, it is evident that its waters formerly did. At present the first bifurcation of the Ganges takes place about 20 miles below Rajmahal. The name of Ganges, or Ganga, continues in the eastern arm; the western is called Bhaghirettee by the natives, and Cossimbazar by the Europeans. The Ganges flows S.E., and the Bhaghirettee S. The Ganges divides again about 40 miles lower down, near Jellinghy, from which the western branch is called the Jellinghy River. It flows mostly in a southern direction, and joins the Bhaghirettee near Nuddea. The island thus inclosed is called the Cossimbazar Island. Another arm branches off from the Ganges a few miles from Jellinghy. This arm, called the Matabunga Branch, runs likewise southward with many large bends, and joins the Bhaghirettee nearly at an equal distance between Nuddea and Hoogly. After the junction of these three arms of the Ganges, the western branch of the Ganges is called the Hoogly, under which name it passes Calcutta and reaches the Bay of Bengal. The principal branch of the Ganges, continuing its course to the S.E., divides into two branches called the Chundna and the Gurroy, which unite again near Colna, and proceed S. to the Bay of Bengal under the name of the Boirub, or Horingotta, which, like the Hoogly, forms a wide æstuary at its mouth. Whilst the Ganges loses a great deal of its waters by sending off so many large branches, besides several smaller ones, it receives new supplies from the Himalaya range and the Brahmapootra. The Ganges runs nearly 1500 miles.

All the affluents of the Ganges rising within the mountain-region of the Himalaya are navigable for smaller or larger river-boats to the very foot of the range for six months and longer. The Ganges itself, and all its arms within the delta, and also the Jumna, are navigable all the year round for vessels of larger or smaller size.

The great plain which is drained by the Ganges and its affluents may be divided into three parts, the plain of Bengal, the plain of Bahar, and the plain of the Doab, Oude, and Rohilcund.

The plain of Bengal extends from the mouths of the Ganges to the Himalaya Mountains, about 280 miles, and its width may perhaps exceed 180 miles. The area is therefore about 50,400 square miles. Its western boundary runs from Balasore on the Bay of Bengal, through Midnapoor, Bishunpoor, and Nagore to Rajmahal, and thence along the Coosy River to the mountains. On the east its border skirts the Tiperah Hills, includes the province of Silhet in the form of a gulf, and follows here and farther north the southern and western declivity of the Garrow Hills, until it traverses the Brahmapootra, and attains in that direction the Himalaya Mountains. On this side the plain is connected with the maritime low tract

of Chittagong and the valleys of Silhet and Asam, which differ considerably in their natural character from the plain of Bengal.

The Tiperah Mountains, which cover a great space between Chittagong and Silhet, seem to form an extensive table-land with an uneven surface, but their interior is entirely unknown. The Garrow Hills are the continuation of that range of mountains which skirts the valley of Asam on the south. They do not rise to a great elevation, their highest summits probably not exceeding 6000 feet above the sea-level.

The plain of Bengal comprehends four natural divisions: the Sunderbunds, the country subject to inundation, the country which is not inundated, and the Tarai. The Sunderbunds occupy the most southern part of the plain between the mouths of the Ganges and Brahmapootra, and as far north as the salt water of the sea is carried by the tides. The greatest length is about 70 miles; the mean width may be about 50 miles. This tract is almost entirely uncultivated. The soil is extremely swampy all the year round, and overgrown with tall trees, which produce excellent timber; these thickets are inhabited by tigers, rhinoceroses, and other wild animals, while the numerous branches into which the different arms of the Ganges divide within this tract harbour crocodiles. The inhabitants are few, owing to the great unhealthiness of the country. Their occupations are the cutting down of timber trees, and the preparation of salt from the sea-water. The country subject to inundation comprehends not only what is called the delta, or the country between the branches of the Ganges, but also the country between that river and the Brahmapootra as far north as 25° N. lat. The inundation is greatest in the eastern districts, especially where the waters of the Brahmapootra are connected with the Ganges, in which part an immense tract of country is covered for several months with water many feet deep, so that at the end of June the towns and villages, which are built on artificial mounds and protected by embankments, appear like islands. The river has then risen 15 feet above its level in the dry season, but it still continues to rise for several weeks, about 5 inches every day. At Custy it rises 32 feet; at Dacca, only 14 feet; at Luckipoor, not more than 6 feet; in the Sunderbunds it is not perceptible. In October, when the water rapidly decreases, the country is sown with rice, and the produce of this tract is sufficient to furnish the whole plain of Bengal with this principal article of food. The western districts of the country subject to inundation are only slightly covered with water; and, though they likewise produce rice, they are principally covered with plantations of mulberry-trees, especially towards the middle tracts; whilst in the northern parts indigo, sugar, cotton, and tobacco are raised in abundance. The country not subject to inundation lies partly west of the Hoogly, and partly north of 25° N. lat. The district west of the Hoogly is of great fertility, especially Burdwan. The country north of 25° N. lat. is fertile and well cultivated in its southern districts, but farther north large tracts of waste land occur. These sterile tracts increase in number and extent as they approach the Tarai (or the swamp), which divides the plain of the Ganges from the lower region of the Himalaya Mountains, and extends from the banks of the Brahmapootra along the foot of the mountains to the place where the Ganges issues from them at Hurdwar. It is a deep swamp, which is covered with a vigorous vegetation and large forest-trees. It is the haunt of elephants, rhinoceroses, wild buffaloes, tigers, monkeys, and other wild animals. The people are few and miserable, and chiefly maintain themselves by cutting down the forest-trees, which are sent to Calcutta and other towns in Bengal.

The plain of Bahar, which extends west of the river Coosy and the Rajmahal Hills as far as the meridian of Allahabad, is divided by the Ganges into two regions. The southern, or Bahar Proper, has not a great width, being narrowed at both extremities by the Rajmahal Hills and the projecting offsets of the Kimoor range. Its surface along the banks of the river is undulating, but farther south it rises into hills. The soil is fertile and is well cultivated. Its principal products are opium, indigo, rice, and cotton. The country north of the Ganges is called Tirhut or Trihuta. It is an inclined plain near the Himalaya Mountains, about 600 or 700 feet above the sea, and sloping towards the Ganges, where its mean elevation may be about 300 feet. Its surface is undulating, and the districts which border on the Ganges do not differ much from Bahar Proper in soil and cultivation. But about 30 or 40 miles from the river large tracts are covered with forest-trees, especially saul-trees, which increase in extent as the country approaches the Tarai.

The portion of the Gangetic plain which extends west of the meridian of Allahabad, and comprehends the Doab, or country between the rivers Ganges and Jumna, together with Oude and Rohilcund, differs considerably from Bahar, and still more from Bengal, in its climate and productions. The water is sooner drained off, and the soil is much drier. As the heat of the summer, though excessive, lasts only a short time, and the cold in winter is considerable, the vegetation differs greatly from that of the lower plain. The winter crops resemble those of Europe, consisting chiefly of wheat, barley, oats, and millet, together with peas, beans, vetches; also tobacco, flax, and hemp. The summer crops, which grow during the rainy season, are rice, javary, cotton, indigo, &c. The palm-tree disappears; but the European fruit-trees grow, together with bananas, custard-apples, and the fruits which have been transplanted from China.

The country which lies to the west of the Jumna, and extends as far as the banks of the Sutlege and Garra, constitutes the connecting link between the plains of the Ganges and the Indus. It is a level tract of loose sand. No mountains or even high hills occur in its whole extent. Where this plain borders on the Himalaya range, it is in some measure watered and fertilised by the numerous small rivers which originate along

the lower declivities; and numerous villages, with some cultivated tracts, occur. Where this country borders on the Indian desert, it is chiefly covered with low sandy hills.

In the Gangetic plain the rains set in towards the end of April or in May, but are not abundant in Calcutta before the beginning of June. At Calcutta the mean annual quantity of rain is 71 to 72 inches, but at Dacca it probably does not fall short of 100 inches. The heat is excessive all the year round, but especially so before the setting in of the rains. The mean annual temperature of Calcutta is 79° of Fahr.; that of the hottest month (May) 86°; and that of the coldest (January) 67°

The Gangetic plain is the most fertile, the best cultivated, and most thickly inhabited portion of Hindustan. It contains more than one-half of all its population, and the number of inhabitants probably exceeds 60,000,000. The number of large towns is considerable. [AGRA; BAREILLY; BENARES; BOGLIPOOR; CALCUTTA; CAWNPOOR; DACCA; DELHI; FURRUCKABAD; FYZABAD; LUCKNOW; PATNA.]

The whole of the Gangetic plain is immediately subject to the government of the British, with the exception of the kingdom of Oude. [OUDE.] The British possessions are annexed to the presidency of Bengal and to the North-Western Provinces.

V. *The Plain of the Indus.*—The Indus, called in its southern course also the Sinde, rises on the table-land of Tibet, about 31° 20′ N. lat., and 80° 30′ E. long. Thence it runs N.W. to Leh in Ladakh. After a course of perhaps not less than 250 miles on a table-land from 12,000 to 15,000 feet above the sea, it is joined below Leh by a large river called the Shayuk. Little is known of the Indus after its junction with the Shayuk, till it issues from the Himalaya range a few miles east of Attock. Above Attock it is joined by the river of Cabul. After leaving the high mountains above Attock, it flows S.S.W. for about 70 miles more between lower ranges, until at 33° 7′ N. lat. it enters the great plain.

As soon as the Indus has left the mountains it divides into four arms, which run S. with great bends, and sometimes unite, but separate again, so that the whole volume of its waters is seldom united in one bed. South of 29° N. lat., near the small town of Mittun Cote, it is joined on the E. by the Chenaub, or united rivers of the Panjab, and changes its southern course to S.W. It is here 2000 yards wide. It continues its S.W. course to Bukkur, and then, turning to the S. and S.S.W., it reaches Hydrabad, above which town a branch separates from the main stream, and flows S.E. to the Runn, out of which it flows by the wide æstuary which separates the island of Cutch from the plains of Sinde. This æstuary is called the Koree, and has 12 feet of water as far as Busta, but farther inland it is not so deep. The western and principal branch of the Indus divides again south of 25° N. lat. below Jarruck, and the smaller or eastern branch loses a great part of its waters before it reaches the sea by the mouth called Sir. Below Tatta, and about 60 miles from the sea, the principal branch of the Indus separates again into two branches, of which the smaller runs W., and the larger, the Sata, continues S.S.E. to the sea. The last-mentioned branch is 1000 yards across, and carries off by far the greatest volume of water. It divides into seven arms before it reaches the sea. The navigation of the Indus along the delta is very dangerous. At a distance of one mile and a half from the sea the main branch of the river is only from 12 to 15 feet deep. Farther from the shore are numerous sandbanks. The spring-tides rise 9 feet in the mouths of the Indus. In the river the tide ascends only 75 miles, and is not perceptible at Tatta.

The Indus receives only one great affluent in its extensive plain; but this affluent unites all the rivers which drain the *Panjab*, or the Five Rivers, the *Pentapotamia* of the Greeks. These five rivers, enumerated from east to west, are the Sutlege or Satadru (the *Zaradrus* of Ptolemæus), the Beeah or Beas (the *Hyphasis* of Arrian), the Ravee (the *Hydraotes* of Arrian), the Chenaub (the *Acesines*), and the Jhilum or Behut (the *Hydaspes*).

The *Sutlege* has the longest course. It originates on the table-land of Tibet. Its course on the table-land, where it flows in some measure parallel to the Indus, is more than 150 miles. So far it flows N.W. Changing its course to S.W., it soon enters the Himalayas, through which it runs in a narrow valley, with numerous bends, more than 100 miles. It enters the plain, near Ropur, whence it flows due west past Loodiana as far as Hurree, where it is joined by the Beas, 31° 10′ N. lat., 75° 5′ E. long. The *Beas* originates in the Himalaya Mountains, traverses the mountain-region with two great bends to the S. and N., and enters the plain above Nadaun after a course of less than 100 miles. Hence it flows W.S.W., gradually approaching the Sutlege, until it joins it. The united river then takes the name of Garra, and, continuing to flow S.W., unites with the Chenaub near Ooch, below Bahwulpoor. The *Ravee* rises in one of the parallel chains of the Himalayas, called the Santch Mountains. Its upper course is not long. Above Kotoa or Kothua it enters the plain of the Panjab, where it flows S.W. till it joins the Chenaub at Fazilshah. The *Chenaub* rises in the Paralasa range of the Himalayas, near the sources of the Beas, and runs for about 100 miles in the mountain-region to the N.W.; it afterwards turns gradually to the W., passes the town of Kishtawar, and, inclining by degrees more to the S., leaves the Himalayas above Jommu, after a course of about 200 miles. In the plain of the Panjab its course is W.S.W., until it has joined the Ravee, when it declines to the S.S.W. The Chenaub is a large river. At Alknur, where it leaves the Himalayas, it is 200 yards wide. At Ramnuggur, when at the lowest, it is 300 yards wide and 9 feet deep. The *Jhilum* rises in the Tibet range of the Himalayas, and flows first N.N.W. in a valley of the mountain-region, and issues from the valley by the Baramula pass. It then passes near Mozufferabad, and turning S. it passes by Jellalapoor, and turning W. reaches the plain. Its course

within the range of the Himalayas exceeds 200 miles. The remainder of its course, somewhat more than 100 miles, is mostly S. till it joins the Chenaub at Trumo, below Lalkanyo. After the five rivers have united, they still flow between 40 and 50 miles until they fall into the Indus at Mittun Cote. The natives call the united river Chenaub, but in the other countries of India it is known by the name of Punjund. All the rivers of the Panjab are in general navigable up to the place where they issue from the mountains, and the Indus itself to Attock, but above that place there is a whirlpool which cannot be passed by boats.

The northern portion of the plain of the Indus, or *Panjab*, extends from the lower ranges of the Himalaya Mountains to the confluence of the Chenaub with the Indus, between 34° and 29° N. lat., and has the form of an isosceles triangle, whose shortest line, or base, about 450 miles in length, lies along the Himalayas, and the equal sides, each about 600 miles, unites at the confluence of the Indus and Chenaub. Its surface may be on an average about 1000 feet above the sea. This immense tract of country varies considerably in soil and surface, containing very fertile and very sterile tracts. Perhaps not more than one-fourth of its surface is under cultivation. The Jullindar Doab, or country between the Sutlege and Beas, is very populous, and so likewise is the Bari Doab, between the Beas and Ravee as far as Amritsir. The cultivated tracts along the rivers are of great fertility. Rice is the principal object of agriculture all over the Panjab, but wheat is also raised in sufficient quantity for the consumption. The sugar-cane is cultivated with great care, and much sugar is made. Wine and different kinds of fruits are produced in many places. Cattle are very numerous, though commonly of small size.

In Lahore the maximum of heat in July is 102°, and the minimum in January 24°. In Mooltan it seems to rise still higher. Rain falls all the year round, but not in equal proportions.

The plain of the Indus probably does not contain one-tenth of the population of that of the Ganges; and the number of considerable towns is very small. The most populous portion is the Panjab. *Amritsir*, which has a population of 100,000, is situated in a fertile country, between the Beas and Ravee, and carries on a considerable trade with Cashmere and Tibet. *Lahore*, on the Ravee, has 80,000 inhabitants, but its commerce is not so great as that of Amritsir. *Mooltan*, on the Chenaub, has 60,000 inhabitants.

The late ruler of the Panjab, Runjeet Sing, always remained on terms of amity with the British government in India, and had not only extended his territories, but had collected before his death a powerful army and large stores of arms and ammunition. He was succeeded by his son, who died, and was succeeded by the present Maharaja, Dhuleep Sing, who being then very young, his mother the Ranee was declared regent. The Sikh army however became mutinous and ungovernable, and the result was that the Lahore government, in order to extricate themselves from the dangers to which they were constantly exposed from the violence of the soldiers, secretly gave its sanction to the leaders of the Sikh troops in making an attack on the British frontier. The Sikh army began to cross the Sutlege Dec. 11, 1845. The result was the three successive victories of Ferozepoor, Dec. 21 and 22, by Sir Hugh Gough; of Aliwal, Jan. 28, 1846, by Sir Harry Smith; and of Sobraon, Feb. 10, by Sir Hugh Gough and Sir Harry Smith. Sir Henry Hardinge, the governor-general, since created Viscount Hardinge, was present in the first and third battles.

After this the remains of the Sikh army retreated from the west bank of the river, with the loss of a vast number of men and 220 pieces of field artillery. The British army crossed the Sutlege, entered the Panjab, and, the Maharaja having delivered himself up to the Governor-General, he was conducted back, and restored to his palace in the city of Lahore on the 20th of February, 1846. A treaty of 'perpetual peace and friendship between the British government on the one part, and Maharaja Dhuleep Sing, his heirs and successors, on the other,' was concluded at Lahore, March 9, 1846. A similar treaty was concluded with the Maharaja Gholab Sing at Amritsir, or Umritsir, March 16, 1846. He was made ruler of the Cashmere States. The conquest of Lahore has added to the British territory a portion of the Lahore territory on the east banks of the Garra and Sutlege, and the Jullindar Doab, between the Beas and the Sutlege, with a considerable portion of hill-country which extends north-east towards the upper part of the Indus.

The ruler of Mooltan, Moolraj, who is subject to the Lahore government, has since rebelled, in conjunction with Shere Sing, another ruler of the Sikhs. At the beginning of December, 1848, Moolraj was strongly intrenched in the city of Mooltan, but the British and native forces, to the number of nearly 50,000, were then assembled in the vicinity, and it was expected that the city would be invested and attacked before Christmas. Shere Sing had been compelled to retreat from the right bank of the Chenaub on the 3rd of December.

Along the southern banks of the Garra is Daoudpootra, or Bahwulpoor, which is subject to an independent Afghan chief or khan, who resides in Bahwulpoor, on the Garra. The southern portion of the plain of the Indus was possessed by the Amirs or Emirs, the descendants of a chief of Beloochistan, who conquered this country towards the end of the last century. Their country is called Sinde, and is now included in the British territory. The country and the circumstances which led to its annexation to the British territory, are stated in the article SINDE.

People of Hindustan.—The aboriginal tribes, besides the Hindus, who are spoken of in a subsequent part of this article, are at present only found in the mountainous parts of the country, where they live chiefly on the produce of the chase and their cattle, though they also cultivate some kinds of grain in the more level parts of the districts occupied by them. Many of them consist of a comparatively small number of families.

We shall only mention those which occupy a considerable extent of country. The most widely dispersed of these tribes are the *Gonds*. They occupy the whole of the mountains extending from the Circars in a north western direction over the higher branches of the Mahanuddy river to the table-land of Omercuntuc, which is in their possession, and west of it to the sources of the Tapty and Whurdha. The Gonds are in a very low state of civilisation compared with the Hindus; they live in a state of independence of the governments whose territories they inhabit, and rarely permit foreigners to traverse their country. The western neighbours of the Gonds are the *Bheels*, who occupy the northern Ghauts and the Vindhya range, together with the mountain region connecting the last-mentioned chain with the Aravulli Mountains. Southward they extend to Poonah, and they are also in possession of the northern portion of the Western Ghauts as far south as the parallel of Damaun. They are not more advanced in civilisation than the Gonds, though they are more intermixed with Hindus, and less independent of their masters. The neighbours of the Bheels, the *Coulies*, are dispersed over a comparatively small tract of country. They occupy the Western Ghauts south of the Bheels, and as far as Bombay, and even farther. They enjoy no independence, are a laborious people, and at Bombay and other places serve as labourers, and especially as porters. Hence porters in Hindustan are commonly called Coulies by Europeans. The *Ramusis* are dispersed over the Western Ghauts south of the Coulies.

The foreigners settled in Hindustan are partly Asiatics and partly Europeans. The Asiatics have come both by sea and by land. To the former class belong the Arabs, who are very numerous on the coast of Malabar. Some Parsees, or Guebres, are dispersed in the cities on the coast between Bombay and Surat. The Asiatics who entered India by land are chiefly settled in the plains of the Ganges and Indus. They came to these countries with the conquerors, who at several epochs have established their empires here. They are mostly Afghans, and commonly called Patans. Their number is said to amount to 10,000,000.

The Europeans in Hindustan are chiefly descendants of the Portuguese, who, being rather conquerors than merchants, established themselves permanently in the places where they settled. They are only numerous along the western coast, where their whole population is said to be 2,000,000, an estimate which is probably exaggerated. Next to the Portuguese the British are the most numerous, but their number is stated not to exceed 60,000.

Territorial Divisions.—British India, strictly speaking, comprises only the territory which is actually in the possession of the British government, but the whole of Hindustan, from the Indus to the frontiers of Birma, with the exception of Nepaul and Bootan, is under British superintendence and control, and in fact forms one great body politic, of which the British government is the head. Some of the states are subsidiary, some are tributary, some are feudatory, and some are otherwise restricted, according to the circumstances and treaties under which they became dependent. The British territory is divided into the presidencies of Bengal, Madras, and Bombay, the North-West Provinces, and the government of Sinde.

The Bengal Presidency comprises the provinces of Bengal, Bahar, Orissa, Cuttack, Gundwana, the Ceded Districts on the Nerbudda, and the British territory east of the Ganges to the frontiers of Birma.

The North-West Provinces comprise the provinces of Allahabad, Benares, Agra, Delhi, Meerut, Rohilcund, and the Jullindar Doab and hill-country connected with it.

The Madras Presidency comprises the Northern Circars, the whole of the Carnatic, and extends westward across the peninsula so as to include all the British territory (Malabar, Canara, &c.) south and west of Mysore.

The Bombay Presidency comprises all the British territory on the west side of Hindustan from Canara northward, the Concan, South Mahratta country, Deccan, Candeish, Surat, &c. The Bombay Presidency will probably be made to include Sinde, which was annexed to the British territory in March 1843, and is yet (Jan. 1849) under a separate governor.

The following table is given, in the deficiency of official returns, merely as an approximation, in order to afford such a general view as may be useful, though not accurate, of the areas and population of the territories of Hindustan:—

British Possessions.	Sq. Miles.	Inhabitants.
Bengal Presidency .	220,000	47,000,000
North-West Provinces	100,000	20,000,000
Madras Presidency .	140,000	14,000,000
Bombay Presidency .	70,000	7,500,000
Sinde	70,000	1,500,000
	600,000	90,000,000
Dependent States.		
Hydrabad	95,000	9,000,000
Berar, or Nagpoor .	45,000	2,200,000
Mysore	27,000	3,500,000
Gwalior and Malwa .	34,000	4,000,000
Gujerat	25,000	2,000,000
Oude	20,000	4,000,000
Lahore	60,000	3,000,000
Bahwulpoor . . .	12,000	500,000
Cashmere States . .	20,000	1,000,000
Sikh Hill States . .	20,000	1,000,000
Bundelcund States .	8,000	1,000,000
Rewah	7,000	600,000
Bhopal	6,000	500,000
Indore	8,000	600,000
Dhar	500	30,000
Sattara	8,000	1,000,000
Colapoor	3,000	600,000
Sawunt Warree . .	1,000	30,000
Bhurtpoor	2,000	500,000
Travancore . . .	5,000	600,000
Cochin	1,500	200,000
Sikim	2,000	140,000

Bikaneer . .	Rajpoot States.	14,000	
Jessulmeer . .		9,000	
Joudpoor . .		25,000	
Jypoor . . .		14,000	
Oodipoor . .		10,000	
Cutch . . .		7,000	12,000,000
Sirohi . . .		3,000	
Kotah . . .		4,000	
Boondee . .		2,000	
Dholpoor, &c. .		2,000	
		500,000	48,000,000
Independent States.			
Nepaul		45,000	1,500,000
Bootan		25,000	500,000
		70,000	2,000,000
Total.			
British Possessions .		600,000	90,000,000
Dependent States .		500,000	48,000,000
Independent States .		70,000	2,000,000
		1,170,000	140,000,000

Ancient India as known to the Western Nations.—Commerce between India and the western nations of Asia appears to have been carried on from the earliest historical times. The spicery, which the company of Ishmaelites mentioned in Genesis (xxxvii. 25) were carrying into Egypt, must in all probability have been the produce of India; and in the 30th chapter of Exodus, where an enumeration is made of various spices and perfumes, cinnamon and cassia are expressly mentioned, which must have come from India or the islands in the Indian Archipelago. This trade appears to have been carried on by means of the Arabs, who brought the produce of India from the modern Sinde or the Malabar coast, to Hadramaut in the south-western part of Arabia, or to Gerra on the Persian Gulf, from which places it was carried by means of caravans to Petra, where it was purchased by Phœnician merchants. Indian articles were also brought from the Persian Gulf up the Euphrates as far as Thapsacus, and thence carried across the Syrian desert into Phœnicia. Europe was thus supplied with the produce of India.

The conquest of Idumæa by David gave the Jews possession of the harbour of Ezion-geber on the Red Sea, from which ships sailed to Ophir, bringing 'gold and silver, ivory, apes, and peacocks.' (1 Kings, ii. 28; x. 11, 22.) Ophir was probably an emporium of the African and Indian trade in Arabia. The Arabian merchants procured the gold from Africa, and the ivory, apes, and peacocks, from India.

The produce of India was also imported into Greece by the Phœnicians in very early times. Many of the Greek names of the Indian articles are evidently derived from the Sanskrit. Thus the Greek word for pepper, *pepperi* (πίπερι), comes from the Sanskrit pippalî; the Greek word for emerald is *smaragdos* or *maragdos* (σμάραγδος or μάραγδος), from the Sanskrit *marakata*. The name of cinnamon was introduced into Greece together with the article. (Herod., iii. 111.) Cinnamon is not Sanskrit. It is generally said that the Greeks obtained their tin, by means of the Phœnicians, from the Scilly Islands or Cornwall; but there is no direct proof of this; and it appears probable, from the Sanskrit derivation of the word, that the Greeks originally obtained their tin from India.

The western nations of Asia appear to have had no connection with India, except in the way of commerce, till the time of Darius Hystaspes, B.C. 521. (Herod. iv. 44.) Darius, it is said, subdued the Indians, and formed them into a satrapy, the tribute of which amounted to 360 talents in gold. (Herod., iii. 94.) The extent of the Persian dominions in India cannot be ascertained.

The knowledge which the Greeks possessed respecting India, previous to the time of Alexander, was derived from the Persians; and such was the origin of the information contained in the third book of Herodotus (98–105). Herodotus had also heard of some of the natural productions of Hindustan, such as the cotton plant and the bamboo; but his knowledge was very limited. Ctesias, who lived at the court of Artaxerxes Mnemon for many years, has given us a fuller account than Herodotus of the manners and customs of the Indians, and of the natural productions of the country. He had heard of the war-elephants, and describes the parrot, the monkey, the cochineal, and other articles.

The expedition of Alexander into India first gave the Greeks a correct idea of the western parts of India. Alexander did not advance farther east than the Hýphasis; but he followed the course of the Indus to the ocean, and afterwards sent Nearchus to explore the coast of the Indian Ocean as far as the Persian Gulf. After the death of Alexander, Seleucus made war against Sandracottus, king of the Prasii, and was the first Greek who advanced as far as the Ganges. His expedition was the means of giving the Greeks a more correct knowledge of the eastern parts of India than they had hitherto possessed; since Megásthenes and afterwards Daimachus resided for many years as ambassadors of the Syrian monarchs at Palibothra (Sanskrit, *Pataliputra*), the capital of the Prasii. From the work which Megasthenes wrote on India, later writers, even in the time of the Roman empire, such as Strabo and Arrian, appear to have derived their principal knowledge of the country. The Greek kingdom of Bactria, which was founded by Theodotus, or Diodotus, a lieutenant of the Syrian monarchs, and which lasted about 120 years (B.C. 255-134), appears to have comprised a considerable part of northern India.

After the foundation of Alexandria in Egypt, the Indian trade was almost entirely carried on by the merchants of that city; but few ships appear to have sailed from Alexandria to India till the supposed discoveries of the monsoons by Hippalus; and the Arabians supplied Alexandria, as they had formerly done the Phœnicians, with the produce of India. The monsoons must have become known to European navigators about the middle of the first century of our æra, since they are not mentioned by Strabo, but in the time of Pliny were well known. Pliny has given us

('Nat. Hist.,' vi. 23) an interesting account of the trade between India and Alexandria, as it existed in his own time.

We have another account of the Indian trade written by Arrian, who lived in all probability in the first century of the Christian æra, and certainly not later than the second. [ARRIAN.] The 'Periplus of the Erythrean Sea' contains the description of the coast from the Red Sea to the western parts of India, and also gives a list of the most important exports and imports.

The knowledge which the ancients possessed of India beyond Cape Comorin was exceedingly vague and defective. The Romans never extended their conquests as far as India, nor visited the country except for the purposes of commerce. We read of embassies to Augustus Cæsar, sent by the Indian princes Pandion and Porus, and also of an embassy from the island of Ceylon to the Emperor Claudius.

We may form some idea of the magnitude of the Indian trade under the emperors by the account of Pliny (vi. 23), who informs us that the Roman world was drained every year of at least fifty millions of sesterces (upwards of 400,000*l*.) for the purchase of Indian commodities. The articles imported by the Alexandrine merchants were chiefly precious stones, spices and perfumes, and silk. The Appendix to Dr. Vincent's 'Periplus of the Erythrean Sea' contains an alphabetical list, accompanied with many explanations, of the exports and imports of the Indian trade, which are enumerated in the Digest, and in Arrian's 'Periplus of the Erythrean Sea.'

In the time of the Emperor Justinian, an Alexandrine merchant of the name of Cosmas, who had made several voyages to India, and afterwards turned monk, wrote a work, still extant, entitled 'Christian Topography,' in which he gives several particulars respecting the Indian trade. Alexandria supplied the nations of Europe with Indian articles till the discovery of the passage round the Cape of Good Hope by Vasco de Gama in 1498. But the western nations of Asia were principally supplied by the merchants of Basra, which was founded by the caliph Omar near the mouth of the Euphrates, and soon became one of the most flourishing commercial cities in the East. In addition to this, a land trade, conducted by means of caravans which passed through the central countries of Asia, existed from very early times between India and the western nations of Asia.

History.—First period: From the earliest times to the Mohammedan Conquest.—The materials for the history of this period are very few and unsatisfactory. The only ancient history written in the Sanskrit language, hitherto discovered, is a chronicle of the kings of Cashmere, entitled 'Raja Taringini,' of which an abstract was given by Abulfazl in the 'Ayin-i-Akbery.' The original Sanskrit was obtained for the first time by English scholars in the present century, and was published at Calcutta in the year 1835: an account of the work is given by Professor Wilson in the fifteenth volume of the 'Asiatic Researches.' But this chronicle gives little information respecting other parts of Hindustan.

The invariable tradition of the Hindus points to the northern part of Hindustan as the original abode of their race, and of the Brahmanical faith and laws. It appears probable, both from the tradition of the Hindus and from the similarity of the Sanskrit to the Zend, Greek, and Latin languages, that the nation from which the genuine Hindus are descended must at some period have inhabited the central plains of Asia, from which they emigrated into the northern parts of Hindustan. But, whatever opinion may be entertained respecting the origin of the Hindus, the Hindus never regarded the southern part of the peninsula as forming part of Aryavarta, or 'holy land,' the name of the country inhabited by genuine Hindus. Aryavarta was bounded on the north by the Himalaya, and on the south by the Vindhya Mountains (Manu, vi. 21–24); the boundaries on the east and west cannot be so easily ascertained. According to Hindu tradition, two empires only existed in the most ancient times, of which the capitals were Ayodhya, or Oude, and Pratishthana, or Vitora. Another kingdom was afterwards established at Magadha, or Bahar, by Jarasandha, who was appointed governor of the province by a sovereign of the Lunar race.

The kings of Ayodhya appear to have conquered the Deccan, and to have introduced the Brahmanical faith and laws into the southern part of the peninsula. We have no means of ascertaining whether these conquests by the monarchs of Ayodhya were permanent, but in the time of Arrian and Pliny the Brahmanical faith prevailed in the southern part of the peninsula, since all the principal places mentioned by these writers have Sanskrit names. We also learn, from tradition and from historical records extant in the Tamul language, that three kingdoms acquired in early times great political importance in the southern part of the Deccan. These were named Pandya, Chola, and Chera, and are all said to have been founded by natives of Ayodhya, who colonised the Deccan with Hindus from the north. The Brahmanical colonists appear to have settled principally in the southern parts of the Deccan: the native traditions represent the northern parts as inhabited by savage races till a much later period.

Hardly anything is known of the history of Hindustan from the time of Alexander to the Mohammedan Conquest. After the overthrow of the Greek kingdom of Bactria by the Tartars, B.C. 126, the Tartars (called by the Greeks Scythians, and by the Hindus Sakas) overrun the greater part of the north-western provinces of Hindustan, which remained in their possession till the reign of Vicramaditya I., B.C. 56, who, after adding numerous provinces to his empire, drove the Tartars beyond the Indus. This sovereign, whose date is pretty well ascertained, since the years of the Samvat æra are counted from his reign, resided at Ayodhya and Canoj, and ruled over almost the whole of northern Hindustan from Cashmere to the Ganges. We also read of two other sovereigns of the same name, Vicramaditya II., A.D. 191, and Vicramaditya III., A.D. 441. The most interesting event in this period of

Hindu history is the persecution of the Buddhists, and their final expulsion from Hindustan. [Buddha.] During this period many of the islands of the Indian Archipelago were colonised both by Brahmans and Buddhists.

Christianity is said to have been introduced into Hindustan in the first century. The first Christians who settled in any number in Hindustan appear to have been Nestorians, who settled on the Malabar coast for the purposes of commerce. When Vasco de Gama arrived at Cochin, on the Malabar coast, he found a great number of Christians, who inhabited the interior of Travancore and Malabar, and who had more than a hundred churches.

Second Period: History of the Mohammedan States.—The earliest invasion of the country by the Mohammedans was probably made in the latter part of the tenth century by Sabuktaghin, a Tartar soldier, who had been proclaimed by the army monarch of Ghizni. He passed the Indus, laid waste the province of Lahore, and returned to Ghizni laden with plunder. But he made no permanent conquests. He died A.D. 997, and was succeeded by his son, the celebrated Sultan Mahmud, who is usually regarded as the first Mohammedan conqueror of Hindustan. He died A.D. 1028, and was succeeded by his son Massud. Massud and his successors were unable to prosecute their conquests in the country, in consequence of the formidable enemies they possessed at home. Several Tartar tribes, denominated Seljukides, from the name of their leader, had been invited by Mahmud to settle in Khorasan. In the year 1171 Yeasuddin, king of Gaur in Khorasan, conquered all the countries west of the Indus which were subject to the monarchs of Ghizni, and compelled the reigning sultan to take refuge in Lahore. Lahore was taken by Mohammed, brother of Yeasuddin, in 1184, and Khosrou II., the last monarch of the house of Sabuktaghin, was put to death.

The Hindus however received no benefit from this change of dynasty. In 1191 Mohammed marched farther east, and, though he was at first defeated by the Hindu rajas, he finally conquered the greater part of the northern provinces. In 1193, Delhi was taken, and made the seat of the Mohammedan government in India. Mohammed succeeded his brother Yeasuddin. The Gaurian dynasty ended in 1289, after having lasted 117 years.

The dominion now passed into the hands of the Afghans. During the reign of Firoz II., who succeeded Kai-Kobad, the Mohammedans first undertook the conquest of the Deccan. The invasion of Timur (Tamerlane) in 1398 overturned the already tottering power of the monarchs of Delhi. Timur did not remain in Hindustan more than a few months. In the reign of Ibrahim II., Baber, a descendant of Timur, invaded Hindustan, and put an end to the Afghan dynasty. In 1526 he took Delhi, and was the founder of the Tartar dynasty, or, as it is usually but erroneously called, the Mogul dynasty. Baber was succeeded by Humaiun, who had a troubled reign, and it was not till the accession of Akbar in 1556 that the Tartar (or Mogul) dominion in Hindustan was placed upon a firm basis. Akbar died in 1605, and was succeeded by his son Selim, who took the title of Jehanghir, *i. e.* 'conqueror of the world.' During the reign of Jehanghir, Sir Thomas Roe arrived at the court of Agra, and obtained from the emperor many advantageous grants to the East India Company. Jehanghir was succeeded in 1627 by Shah Jehân, during whose reign a great part of the Deccan was conquered by his son Aurungzebe. Shah Jehân was thrown into prison by Aurungzebe, in which he died at the age of 74, on the 21st January, 1666. He was succeeded by Aurungzebe, who had been proclaimed emperor in 1659. Aurungzebe was the last powerful sovereign that ruled over the Mogul empire of Hindustan. After the death of Aurungzebe in 1707, the Mogul dominion rapidly declined. The last sovereign, Shah Alum II., at last became the pensioner of the East India Company, which succeeded to the power of the Mogul emperors.

Third Period: History of the European Conquests.—The Portuguese were the first nation of Europe that obtained any dominion in Hindustan. Vasco de Gama landed with three ships at Calicut on the Malabar coast, on the 20th of May, 1498. The Portuguese rapidly acquired extensive power in the country, and by their numerous settlements along the Malabar coast, especially at Goa and Diu, they monopolised the commerce with Europe. In the beginning of the seventeenth century, the English, Dutch, and French began to make settlements along the coast; and the Portuguese lost their dominions almost as rapidly as they had acquired them.

The Dutch never acquired much political power in Hindustan, though at one time they carried on the greater part of the Indian trade. The French obtained extensive possessions in the Deccan. Their principal settlement was at Pondicherry, of which they acquired possession in the latter part of the seventeenth century, and which soon became one of the most splendid European establishments in the country. But their power in the Deccan was principally owing to the wise and vigorous government of Dupleix in 1749. Under his administration the Northern Circars were occupied by the French, and the English power was almost destroyed. Dupleix was succeeded by Count de Lally, who was sent from France with a large fleet in 1756; but this expedition entirely failed; and Pondicherry was taken by the English in 1761. At present the French possessions consist only of Pondicherry, which was restored, and a few other places.

The commencement and early progress of the political power of the British in Hindustan have already been described. [Bengal; East India Company.]

Languages.—The numerous languages spoken in Hindustan at the present time may be divided into two great classes: the one consisting of those languages which are derived from the Sanskrit, and which are spoken in the northern and central provinces; and the other comprising those languages which are unconnected with the Sanskrit, and which are spoken in the southern parts of the peninsula. The ground-work of these languages

is Sanskrit, as the Latin is of the Italian or Spanish, with a comparatively small number of words which cannot be traced to a Sanskrit source. These languages are not however derived immediately from the Sanskrit, but through the medium of the Prakrit, which is still more akin to the Sanskrit than the vernacular languages of Hindustan, and which became the modern language of the people when the Sanskrit ceased to be spoken. None of the dialects of the Prakrit are spoken at the present day; but several works, especially parts of dramatic poems, are preserved in these languages.

The languages derived from the Sanskrit may be said in general terms to be spoken in the provinces which lie between the Himalayas and Vindhya Mountains; which is the proper country of the Hindus. But the Sanskrit appears to have been also spoken to a considerable extent in the northern part of the Deccan.

The languages spoken in the countries bordering on the northern and north-eastern provinces of Hindustan have no connection with the Sanskrit, but belong to an entirely different family of languages. Those which are spoken in the countries watered by the Indus are closely related to the Sanskrit. It is almost impossible to draw any line which shall separate the languages of Sanskrit origin from those which are derived from the Zend, the ancient language of Persia.

A list of the modern languages derived from the Sanskrit may be formed from Lassen's 'Prakrit Grammar.' Of the languages spoken in the eastern part of Hindustan, the most important is the Bengâlî.

The Hindustânî is not limited to any particular district, but is spoken by almost all the natives in addition to their own dialects in the northern and central provinces of Hindustan. This language appears to have been formed from the Brâja Bhâkâ and the Prakrit, which was spoken in the extensive empire in northern India, of which Kânyâkubja, or Canoj, was the capital. The Hindustânî was much cultivated under Akbar and the following emperors, and numerous poems, by Mohammedans as well as Hindus, were composed in this language. The Hindî is the same language as Hindustânî, but differs from it chiefly in retaining Sanskrit words, while the Hindustânî substitutes for them words of Persian and Arabic origin. The Hindî is the dialect which is chiefly cultivated by Hindu poets.

To Europeans who wish to commence the study of Hindustânî the following works may be recommended:—'Grammar of the Hindustani Language,' by Shakespear, 4to., London, 1826; 'Rudimens de la Langue Hindoustani,' by Garcin de Tassy, 4to., Paris, 1829; 'Hindoostanee Interpreter, containing the Rudiments of Hindoostanee Grammar,' by W. C. Smyth, 8vo., London, 1824; 'Introduction to the Hindoostanee Language,' by W. Yates, 8vo., Calcutta, 1827; 'Muntakhabat-i-Hindi, or Selections in Hindustani, with Verbal Translations and a Grammatical Analysis,' by Shakespear, 2 vols. 4to., London, 1834-35; 'Les Aventures de Kamrup, par Tahcin-Uddi; publiées en Hindoustani,' par Garcin de Tassy, 8vo., Paris, 1835; 'Intikhab-i-Ikwan-us-Suffa, or Hindi Selections,' by J. Michael, 4to., London, 1829; 'Naklat-i-Hindi, or Hindi Stories,' by J. Michael, 4to., London, 1829; and the various elementary works published by Gilchrist. Dictionaries in Hindustânî and English have been published by W. Hunter, originally compiled by J. Taylor, 2 vols. 4to., Calcutta, 1808; W. C. Smyth, abridged from Taylor and Hunter's work, 8vo., London, 1820; and Shakespear, 4to., London, 1834. An English and Hindustânî Dictionary has been published by Gilchrist, under the title of 'Hindoostanee Philology,' 4to., Lond., 1825.

There are also many mountainous parts and forests in the northern provinces of Hindustan inhabited by numerous tribes, who do not profess the Brahmanical faith, and who speak a language entirely unconnected with Sanskrit. These tribes, who are known by the names of Bheels, Gondas, and Puharees, inhabit the mountainous tracts in Candeish, Malwa, Rajpootana, Gondwana, and the Rajmahal Hills in Bengal.

Languages not derived from the Sanskrit.—Mr. Ellis observes ('Preface to Campbell's Teloogoo Grammar') that the members constituting the family of languages which may appropriately be called the dialects of southern India are the high and low *Tamil*; the *Telugu*, grammatical and vulgar; *Carnátaca*, or *Canndádi*, ancient and modern; *Mălăyâlma*, or *Malayâlam*, which, after Paullinus à St. Bartholomæo, may be divided into *Grantha-Malabarica* and *Common Malayâlam*, though the former differs from the latter only in introducing Sanskrit terms and forms in unrestrained profusion; and the *Tuluva*, the native speech of that part of the country to which in our maps the name of Canara is confined. Besides these there are a few local dialects of the same derivation, such as the *Cŏdugu*, a variation of Tuluva, spoken in the district of that name, called by us Coorg. The groundwork of all these languages is the same.

Castes.—The division of the Hindus into classes or castes, with fixed occupations, existed from the earliest times: the word caste is derived from the Portuguese word *casta*, 'race,' or 'lineage;' in Sanskrit they are called *varnas*, that is, 'colours.' The most ancient portion of the Vedas alludes to such a division; and in the laws of Manu, the Ramayana, the Mahabharata, and all the other Sanskrit works of the greatest antiquity, we find the system of castes fully developed. The Greeks who visited the country describe its inhabitants as distributed into certain classes. (Arrian, 'Indic.,' c. 11, 12; Diodor. Sic., ii. c. 40, 41; Strabo, xv. c. 1, pp. 485-6, Casaubon; Pliny, 'Hist. Nat.,' vi. c. 19.) We have no means of ascertaining the origin of this institution.

All the Hindu writings recognise only four pure castes: Brahmans, Kshatriyas, Vaisyas, and Sudras. Pliny ('Nat. Hist.,' vi. 19) appears to have heard of the same number; but Megasthenes, from whom Arrian, Strabo, and Diodorus Siculus derive their account, mentions seven classes:—1, philosophers; 2, agriculturists; 3, herdsmen and hunters; 4, handicraftsmen and

artisans; 5, warriors; 6, public inspectors; 7, royal councillors. But Megasthenes has evidently separated into distinct classes individuals belonging to the same class: the public inspectors and royal councillors belonged without doubt to the Brahmanical class, as well as the philosophers; the agriculturists, herdsmen, and hunters, to the Vaisyas; and the handicraftsmen and artisans, to the Sudras.

The following extract from the 'Jatimala,' a Sanskrit work on Hindu castes, gives the common Hindu tradition respecting the origin of each caste. 'In the first creation by Brahma, Brahmanas proceeded, with the Veda, from the mouth of Brahma. From his arms Kshatriyas sprung; so from his thigh Vaisyas, from his foot Sudras, were produced: all with their females. The Lord of Creation, viewing them, said, "What shall be your occupations?" They replied, "We are not our own masters; O God, command us what to undertake." Viewing and comparing their labours, he made the first tribe superior over the rest. As the first had great inclination for the divine sciences (*Brahme veda*), therefore he was Brahmana. The protector from ill (*Kshayate*) was Kshatriya. Him whose profession (*Vesa*) consists in commerce, which promotes the success of wars for the protection of himself and mankind, and in husbandry and attendance on cattle, he called Vaisya. The other should voluntarily serve the three tribes, and therefore he became a Sudra; he should humble himself at their feet.'

A strong line of demarcation is drawn between the first three castes and the Sudras. The former are allowed to receive instruction from the Vedas, and are considered to have been born again in a spiritual sense, whence they are called regenerate. The emblem of this second birth is a peculiar kind of girdle or cord, which differs according to the caste, and with which a Brahman may be invested from his eighth to his sixteenth year, a Kshatriya from his eleventh to his twenty-second year, and a Vaisya from his twelfth to his twenty-fourth year; though in certain cases the investiture may be made in the fifth, sixth, or eighth years respectively. (Manu, ii. 36-38.) A Sudra, on the contrary, is not reckoned among the regenerate, and would, according to the ancient Hindu law, be put to death for reading the Vedas.

The Brahmans still hold the first rank in Hindu society. But in consequence of the conquest of the country by foreign rulers, and the prevalence of many sects that have rejected their authority, they no longer possess the power they once enjoyed. The increasing acquaintance of the Hindus with the English language and literature, and the establishment of public schools, are tending still father to diminish their influence.

The Kshatriya, or military class, is said by the Brahmans to be extinct; but the Rajpoots and the Nairs in the Deccan in all probability belong to this class, though the Brahmans assert that they are only Sudras. The decay of the Kshatriya class may have been owing to the peaceful habits of the people and their freedom from foreign invasion, and the consequent want of employment for a military class. But according to an ancient tradition the Kshatriya caste was destroyed by Parasu Rama, the sixth incarnation of Vishnu, and their land bestowed upon the Brahmans. The laws of Manu appear to refer to the same tradition in a passage where a list of Kshatriyas is given, who, 'by the omission of holy rites and by seeing no Brahmans, have gradually sunk among men to the lowest of the four classes.' (x. 43, 44.)

The duty of the Sudra is servile attendance upon the higher classes, and especially the Brahmans, but he may also follow mechanical occupations, as joinery and masonry, and practical arts, as painting and writing; and, although a man of a lower tribe is in general restricted from the arts of a higher class, the Sudra is expressly permitted to become a trader or a husbandman. (Colebrooke, 'On the Indian Classes—Miscell. Essays,' vol. ii. p. 187.) The statements of Robertson, Mill, and many other writers, respecting the strictly hereditary nature of all trades and occupations in India, are considerably exaggerated. A certain liberty of choice is given to the Brahmans, even by the laws of Manu; and a similar latitude is allowed to the Kshatriya and Vaisya classes.

A great portion of the population of India does not belong to any of the four pure castes. The individuals who form what is usually termed the impure or mixed classes, called in Sanskrit *Varna-Sankara*, i. e. 'mixture or confusion of classes,' are either the original inhabitants of the country who have never professed the Hindu faith, or persons who originally belonged to one of the four pure classes, and have either lost caste themselves, or are descended from those who had lost caste, or the offspring of marriages between persons of different castes.

As early as the compilation of the laws of Manu the number of mixed classes had become considerable. The tenth chapter is principally devoted to an enumeration of the mixed classes, with the respective occupations of each.

Religion and Philosophy.—It is erroneous to suppose that the Hindus have always professed the same faith. The sects into which the Hindus are divided in the present day are of modern origin; and the system of theology taught by these sects differs very much from the ancient religion of the people.

The whole of Indian theology is professedly founded on the Vedas, which are four in number; the Rig-, Yagur-, Sama-, and Atharvana- Veda. Only a small portion of them has hitherto been known to Europeans; and our principal information about them is a dissertation by Mr. Colebrooke, in the eighth volume of the 'Asiatic Researches.' A few of the hymns of the Rig-Veda were published, with a Latin translation, under the title of 'Rig-Vedæ Specimen,' by the late Dr. Rosen, Lond., 1830.

The original worship of the Hindus appears to have been addressed to the elements. In the Mantras, or prayers, which form the principal portion of the Vedas, Indra, or the firmament, fire, the sun, the moon, the air, the spirits, the atmosphere, and the earth, are the objects most

frequently addressed. The mythology of the Vedas personifies the elements and the planets, and thus differs from the more recent legendary poems, which inculcate the worship of deified heroes.

The Vedas undoubtedly teach the belief of one supreme God. Mr. Colebrooke remarks that 'the deities invoked appear, on a cursory inspection of the Veda, to be as various as the authors of the prayers addressed to them; but, according to the most ancient annotations on the Indian Scriptures, these numerous names of persons and things are all resolvable into different titles of three deities, and ultimately of one God.' The name of this supreme deity, omnipotent, omniscient, and omnipresent, is *Brahmă*, who is no longer an object of worship, but merely of devout contemplation. His attributes are represented by the three personified powers of creation, preservation, and destruction, which, under the respective names of Brahmâ, Vishnu, and Siva, form the *trimurti* (that is 'three forms'), or triad of principal Hindu gods. These deities are sometimes represented singly with their respective attributes, and sometimes with one body and three heads. It would be impossible in our limits to give any account of the numerous inferior deities, which are said by Ward ('View of the Hindoos,' p. xviii. 6, Serampore, 1815) to amount, according to the computation of the Hindus, to 330 millions.

The worship of these gods, as well as of numerous others, which was once very popular in Hindustan, has almost entirely disappeared, in consequence of the exclusive worship which is paid to Vishnu, Siva, Sakti, and a few other deities, by the religious sects of the Hindus of the present day. Each sect maintains that the god which it worships unites in his person all the attributes of the deity. The exclusive worshippers of Vishnu, Siva, &c., must not be confounded with the orthodox worshippers of these deities. Few Brahmans of learning will acknowledge themselves to belong to any of the popular divisions of the Hindu faith; they acknowledge the Vedas, Puranas, and Tantras, as the only orthodox ritual, and regard all practices not derived from these sources as irregular and profane. Some of these sects appear to have arisen in great measure in opposition to the Brahmanical order; their teachers are frequently chosen from the lower castes, and the distinction of caste is in a great measure lost in the similarity of schism. (Wilson, 'On the Religious Sects of the Hindus,' in 'Asiatic Researches,' vol. xvi.)

A belief in the transmigration of souls forms an important tenet in the Hindu faith. It is the great object of Hindu worship to obtain a state of future existence, which is supposed to be effected by a reunion of the spiritual nature of man with that primitive spirit which pervades all nature, and which receives the souls of men, when they have been purified, into its essence. The prevailing notion of the means by which an individual may accomplish this object is, by subjecting the body to sufferings and privations, and withdrawing from all intercourse with mankind.

The Hindus have various philosophical systems which they consider to be orthodox, that is, in accordance with the theology and metaphysics of the Vedas; and others which are deemed heretical, as incompatible with the doctrines of their holy books. The professed design of all these schools is 'to teach the means by which eternal beatitude may be attained after death, if not before it.'

An account of the philosophical tenets of the Hindu sects is given by Mr. Colebrooke in his essay 'On the Philosophy of the Hindus,' in the 'Transactions of the Royal Asiatic Society,' vol. i. pp. 19-43; pp. 92-118; pp. 349-361; vol. ii. pp. 1-39; reprinted in his 'Miscellaneous Essays,' vol. i. pp. 227-325. See also Kennedy on the 'Vedanta System,' in the third volume of the 'Transactions of the Royal Asiatic Society.'

Laws.—Works on law form an important branch of Sanskrit literature. Of these the most celebrated is the code generally known under the title of the Institutes of Manu. Halhed's 'Code of Gentoo Laws,' London, 4to., 1776; 8vo., 1777, was compiled under the administration of Mr. Hastings by the most experienced lawyers selected from every part of Bengal. Several other works on Hindu law have been published at Calcutta, of which the most important are:—'Dâyâ Bhâga, a Treatise on Inheritance,' 1814; new edition, 1829; 'Dayâ-Crama-Sangraha, an original Treatise on the Hindoo Law of Inheritance, with an English Translation by P. M. Wynch,' 1818; 'Dâyâ Tatwa, a Treatise on the Law of Inheritance, by Raghunandana Bhattâchârya,' 1828; 'Two Treatises on the Hindu Law of Inheritance, from the Dâyâ Bhâga, and the Mitakshara, translated by H. T. Colebrooke,' 1810.

Arithmetic, Algebra, and Astronomy.—The reader is referred to the articles Arithmetic; Astronomy; and Viga Ganita, in this work.

Medicine.—Professor Wilson remarks ('Oriental Mag.,' Calc., Feb. 1823), that there is reason to conclude, from the imperfect opportunities of investigation we possess, that in medicine, as in astronomy and metaphysics, the Hindus once kept pace with the most enlightened nations of the world, and that they attained as thorough a proficiency in medicine and surgery as any people whose acquisitions are recorded, and as indeed was practicable, before anatomy was made known to us by the discoveries of modern times. It might easily be supposed that their patient attention and natural shrewdness would render the Hindus excellent observers, whilst the extent and fertility of their native country would furnish them with many valuable drugs and medicaments. The *Nidan*, or Diagnosis, accordingly appears to define and distinguish symptoms with great accuracy, and their *Druvyabhidhana*, or Materia Medica, is sufficiently voluminous. They have also paid great attention to regimen and diet, and have a number of works on the food and general treatment suitable to the complaint, or favourable to the operation of the medicine administered. This branch they entitle *Pathapathya*. To these subjects are to be added the *Chikitsa*, or medical treatment of diseases, on which subject they have a variety of compositions, containing much

surdity, with much that is of real value, and the *Rasavidya*, or pharmacy, in which they are most deficient.'

The medical writings of the highest antiquity and authority are collectively called the 'Ayur Veda,' and are supposed to be a portion of the fourth or 'Atharva Veda.' The most celebrated parts of the 'Ayur Veda' are the treatises of Charaka and Susruta. Part of the work of Susruta has been published at Calcutta, 1835. Professor Royle, in an essay 'On the Antiquity of Hindoo Medicine,' and a writer in No. 15 of the 'Journal of Education,' p. 176, inform us that a variety of medical treatises were translated from the Sanskrit into Persian and Arabic, and give many reasons for believing that the Arabs derived their principal knowledge of surgery and medicine from the Hindus. In the present day surgery is not studied by the Hindus.

Arts, &c.—It is evident from the most ancient Sanskrit works, as well as from the testimony of the Greeks, who visited the country, that the useful and fine arts had attained a considerable degree of perfection among the Hindus in very early times. The Ramayana contains numerous proofs of the progress they had made in working metals. The art of smelting iron ore and of manufacturing steel is undoubtedly of great antiquity (Ctes., 'Indic.,' c. 4); and their skill in the manufacture of gold and silver ornaments is evident from the descriptions of the Ramayana.

The degree of perfection to which the Hindus carried the art of weaving in ancient as well as modern times is well known. Their country has always been distinguished for the number and excellence of the substances which it contains for dyeing colours; and the beauty and brilliancy, as well as durability, of their colours were as celebrated among the Greeks and Romans as among ourselves. (Ctes., 'Indic.,' c. 21; Strabo, xv. pp. 1018–1024; Pliny, 'Nat. Hist.,' xxxv. c. 6.) Silk also, as already remarked, was probably manufactured in India in very early times.

The art of obtaining intoxicating liquors by distillation is mentioned in the Ramayana and the laws of Manu (xi. 95).

In painting the Hindus have not attained much proficiency: their artists draw with great accuracy, but they have no knowledge of perspective. With regard to music their instruments are numerous; but their compositions are confined to a few simple melodies, 'many of which possess,' according to Sir W. Ouseley, 'the plaintive simplicity of the Scotch and Irish, and others a wild originality pleasing beyond description. Counterpoint seems not to have entered at any time into the system of Indian music.' ('Oriental Collections,' vol. iii. p. 298.) An account of Hindu music is given by Sir William Jones in his essay 'On the Musical Notes of the Hindus' ('As. Res.,' vol. iii. pp. 55–87). The Hindus lay claim to the invention of the game of chess.

With respect to the present state of the arts among the Hindus, Bishop Heber remarks ('Journal,' vol. iii. pp. 251–2), 'Nor is it true that in the mechanic arts they are inferior to the general run of European nations. Where they fall short of us (which is chiefly in agricultural instruments and the mechanics of common life), they are not, so far as I have understood of Italy and the south of France, surpassed in any great degree by the people of those countries. Their goldsmiths and weavers produce as beautiful fabrics as our own; and it is so far from true that they are obstinately wedded to their old patterns, that they show an anxiety to imitate our models, and do imitate them very successfully. The ships built by native artists at Bombay are notoriously as good as any which sail from London or Liverpool. The carriages and gigs which they supply at Calcutta are as handsome, though not so durable, as those of Long Acre. In the little town of Monghyr, three hundred miles from Calcutta, I had pistols, double-barrelled guns, and different pieces of cabinet-work brought down to my boat for sale, which in outward form nobody could detect to be of Hindu origin; and at Delhi, in the shop of a native wealthy jeweller, I found brooches, earrings, snuff-boxes, &c., of the latest models, and ornamented with French devices and mottoes.'

Most of the subjects treated of in this part of the article are discussed with considerable learning by Bohlen in his 'Das Alte Indien,' Königs., 2 vols. 8vo., 1830; and in a more popular manner in the 'Hindoos,' in the 'Library of Entertaining Knowledge,' published under the superintendence of the Society for the Diffusion of Useful Knowledge, 2 vols. 12mo., 1834–35.

Architecture.—The architecture of the Hindus has hitherto been little studied by professional men. In the absence of plans, elevations, sections, and other details, it will be useful to call attention to some of the resemblances and distinctions existing between Hindu and Egyptian architecture. If there existed no other resemblance between the architecture of the two regions, there would be a decidedly strong one in their hypogæa, or subterraneous cavern-structures hewn out of the solid rock. Of these works of exstruction, as they may be called, whose antiquity, at the most moderate computation, extends to several centuries before the Christian era, the most remarkable are those on the island of Elephanta, near Bombay; at Kennery, in that of Salsette; those at Elora, near Dowletabad; and those at Carlee, not far from Poonah. [ELEPHANTA; POONAH; SALSETTE.] Many of those excavations are of prodigious extent, being composed of a series of apartments and recesses cut out of the rock, amounting in some instances to an almost incredible number. While colossal statues and sculptures display themselves within these cavern-temples and on their walls, elaborate embellishments of detail are frequently given to the columns, which appear capriciously put together, it being impossible to determine where their pedestals terminate and their shafts commence, or how much of the shafts belong to the capitals. In this respect the Hindu style, at least this earliest class of it, differs materially from that of the Egyptians, where the shafts have no pedestals, and scarcely anything like a distinct base, but where the capital is plainly distinguishable from the rest of the column.

It is difficult to form any sort of classification,

either architectural or chronological, of these excavated temples; but there is one obvious distinction, that in some of them the ceiling is quite flat, as at Elephanta; in others hollowed out, so as to resemble more or less a regular vaulting, as is the temple-cave of Kennery, in Salsette, and that at Carlee, near Poonah. The ground-plan of an arched temple of Buddha at Elora is exactly similar. Afterwards this form of roof appears to have been elaborated with great industry and skill, for that of the Temple of Mahadêva at Nadone exhibits a perfect model of the most ancient style of dome in the East, and is probably anterior to anything of the kind in Roman architecture. The stones are placed so as gradually to project one beyond the other, the apex being closed by a circular key-stone. The principle therefore is that of a horizontal instead of a radiating pressure, and, the edges of all these projections being rounded off, the spectator sees, on looking up, a vault composed of gradually diminishing circles or annular courses of masonry.

In this respect then even the earlier Hindu style presents a marked difference from that of the Egyptians, whose edifices are all covered with flat horizontal ceilings. On the other hand, the affinity between the architectural taste of the two people is strongly marked by the prevalent use of colossal statues placed against piers or walls; by the use of Caryatid figures, or such as serve as columns; by the general disposition of the sacred buildings; and by the profusion of inscriptions and symbolic sculptures on the walls.

On examining the Hindu works of construction, or edifices erected above ground, we can hardly avoid being struck by the prevalence of pyramidal masses and forms, as exhibited in pagodas or towers. The Egyptian structures of this kind bear a much closer resemblance to natural or

Pagoda at Tanjore.

rudely constructed prototypes than do those of the Hindus. The gopuras, or pagoda towers erected over the gateways leading to temples are indeed pyramidal in their general form, but infinitely more complex than, not the pyramid alone, but anything else we meet with in Egyptian architecture. Neither do they terminate in a point or mere platform, but have generally a great deal of ornament bestowed on their summit, which sometimes assumes, not inelegantly, the form of a crown. Besides this, they differ from the pyramid in being of far loftier proportions. Of a domical termination, if not exactly a dome, we have an example in the great pagoda at Tanjore, which is considered one of the finest specimens of the kind in India.

There is another class of Hindu monuments, namely, the temples erected by the Jains, or chief sect of the Buddhists. Some of these were erected long prior to the Christian æra, and are distinguished alike by chasteness and beauty of design, and by rich and exquisite finishing. That at Ajmeer, which is said by Tod to be, with the exception of the cave-temples, probably one of the oldest now existing in India, is remarkable for the elegance and slenderness of its columns, so very different in their character from those in the excavated works, and which might therefore be thought to indicate a totally different period of art. The great temple at Bareilly is also a structure of most complicated and exquisite workmanship.

The Essay *On the Architecture of the Hindus*, Lond., 1834, by Rám Raz, is curious as giving the technical rules of the art, as derived from ancient treatises.

HINGE, a kind of joint, upon which doors, gates, shutters, box-covers, &c., are made to turn in the act of opening and shutting. Hinges are constructed in a great variety of forms; but in most of the commoner kinds the action is that of a hollow cylinder working round a fixed central pin. In Collinge's patent hinges, which are peculiarly adapted for hanging large heavy doors and gates, the principal rubbing action is between a hollow cap and an accurately turned sphere, formed, as it were, upon the end of the pin, a cavity being provided for the reception of a supply of oil to lubricate the rubbing surfaces. Mr. Redmund is the inventor of the rising hinges so frequently used for hanging room-doors in houses of superior character. In ordinary door-hinges the hollow cylinder which works round the axis or central pin is divided transversely into two or more portions; but in the rising hinges, instead of the hollow cylinder being divided transversely at right angles, it is divided by spiral or rather helical lines. The result of this contrivance is that when the door is opened it is lifted up a little from the floor by the sliding upon one another of the inclined helical surfaces; so that, although the door may shut very close to the floor, it rises, when opened, to a sufficient height above the floor to allow its lower edge to clear the carpet. Other forms of hinges are very numerous.

HINNITES. M. Defrance gave this name to a few fossil species of *Conchifera monomyaria*

which occur in supracretaceous strata; one (*H. Dubuissonii* of Sowerby) is found in the English crag.

HIPPA, HIPPA TRIBE, *Hippides* of Latreille, *Hippians* of M. Milne Edwards, the latter of whom thus describes these crustaceans belonging to his family of *Pterygura*:—The tribe is composed of a limited number of small anomurous crustaceans which appear to be especially framed for burrowing in the sand, and which present extraordinary forms. The carapace is longer than it is wide, and very convex transversely, presenting always on each side a great lamellar prolongation, which more or less covers the base of the feet; it is truncated posteriorly, and appears to be continuous with the anterior portion of the abdomen, which is very wide and lamellar laterally. One of the pair of antennæ is always very long. The external jaw-feet do not present a conformation like that which is observable in the greater part of the crustaceans treated of in the prior part of M. Edwards's system; they have neither flagrum (fouet) nor palp, and their last three joints are very well developed. The sternum is linear, and the feet are imperfectly extensile; those of the first pair are monodactylous, or subcheliform, and those of the two or three succeeding pairs are terminated by a lamellar joint proper for burrowing. The posterior feet are filiform, semimembranous, recurved forward, and hidden between the lateral parts of the carapace and the base of the preceding feet. The penultimate ring of the abdomen is always furnished with a pair of false feet, terminated by two more or less oval ciliated blades or laminæ; but these appendages have a forward curvature, and are not applied against the seventh segment so as to form with it a fan-shaped caudal fin, as in the *Macrura*. The vulvæ are on the first joint of the third pair of feet. The branchiæ are disposed on a single line, and inserted by a peduncle which rises near the lower third of their internal surface. This tribe is divided into three genera, *Remipes*, *Albunea*, and *Hippa*.

As examples we may mention *Remipes testudinarius;* length of carapace 15 lines; locality, the coast of New Holland. *Albunea Symnista;* length of carapace 10 lines; locality, the seas of Asia. *Hippa emerita;* length from 1 inch to 15 lines; locality, the coasts of Brazil.

HIPPA'LIMUS, a genus of zoophyta proposed by Lamouroux. Goldfuss supposes that it may be included in his genus *Scyphia*. It is fungiform and pediculated, with pores on the upper surface only, and a deep central pit. From the blue marls of the department of Calvados.

HIPPARCHUS, the first astronomer on record who really made systematic observations, and left behind him a digested body of astronomical science. He was born, according to Strabo, at Nicæa in Bithynia, and was alive, as appears from his observations preserved by Ptolemæus, in the interval 160-125 B.C.; but neither the year of his birth nor that of his death is recorded. His astronomical observations were probably commenced in Bithynia, and certainly continued at Rhodes; whence he is called by some authors the Bithynian, and by others the Rhodian, and some even suppose two astronomers of the same name, which is certainly incorrect.

The writings attributed to Hipparchus are all lost except a commentary on Aratus, written probably when he was young, since he does not mention any of his subsequent discoveries, and the results of observation are not so correct as those of his catalogue.

The following summary is from the preface to Delambre's 'History of Ancient Astronomy,' in which work will be found the most complete account of the labours of Hipparchus. The bias of this historian seems to be, to add to Hipparchus some of the fame which has been generally considered due to Ptolemæus, for which he gives forcible reasons. 'Let no one be surprised at the errors of half a degree which we attribute to Hipparchus, seemingly with reproach. It must be remembered that his astrolabe was nothing but an armillary sphere, of no great diameter, and with very small subdivisions of a degree, as well as that he had neither telescope, vernier, nor micrometer. What should we do even now if deprived of these helps, and if we knew neither the refraction nor the true altitude of the pole, on which point, even at Alexandria, and with armillæ of every sort, an error of a quarter of a degree was committed? At this day we dispute about a fraction of a second: they could not then answer for any fraction of a degree, and might be wrong by a whole diameter of the sun or moon. Let us rather think of the essential services which Hipparchus rendered to astronomy, of which science he is the true founder. He was the first who gave and demonstrated methods of solving all triangles, whether plane or spherical. He constructed a table of chords, of which he made nearly the same use as we now do of our tables of sines. He made many more and much better observations than his predecessors. He established the theory of the sun in such a manner that Ptolemæus, 263 years afterwards, found nothing to change. It is true that he mistook the inequality of the sun's motion: but it can be shown that his mistake arose from an error of half a day in the time of the solstice. He himself avows that he may have been wrong by a quarter of a day; and we may always safely suppose that, without impeachment of an author's integrity, his self-love may halve the error which he is really liable to commit. He determined the first inequality of the moon (the equation of the centre), and Ptolemæus found nothing to change in his result: he gave the mean motion of the moon, and that of the apogee and nodes, in which the corrections made by Ptolemæus were slight, and of more than doubtful goodness. He had a sight of the second inequality (the evection); it was he who made all the observations necessary for a discovery of which the honour was reserved for Ptolemæus; a discovery which he had not perhaps time to finish, but for which he had prepared everything. He showed that all the hypotheses of his predecessors were insufficient to explain the twofold inequality of the planets; he predicted that none would be successful which did not combine the two hypotheses of the excentric and epicycle. He had not

the proper observations, because they require more time than the duration of the longest life; but he made them ready for his successors. We owe to his catalogue the important knowledge of the retrograde motion of the equinoctial points. We might, it is true, have derived this knowledge from much better observations, made within the last hundred years; but we should then have had no proof that this motion remains sensibly the same through a long course of ages; and the observations of Hipparchus, by their number and their antiquity, and in spite of the errors which we are obliged to admit, give important confirmation to one of the fundamental points of astronomy. It is to him that we owe the first discovery of this phenomenon. He also invented the planisphere, or the method of describing the starry heavens upon a plane, and of deducing the solution of problems in spherical astronomy by a method often more exact and convenient than that of the globe itself. He is also the father of real geography, through the happy idea of marking the position of towns in the same manner as that of the stars, by circles drawn through the pole perpendicularly to the equator, that is, by latitudes and longitudes. His method, by means of eclipses, was for a long time the only one by which the longitude could be determined; and it is by means of the projection of which he was the author that we now make our maps of the world and our best geographical maps.'

HIPPIAS. [PISISTRATUS.]

HIPPOBRO'MA, a genus of plants belonging to the natural order *Lobeliaceæ*. *H. longiflora* is the only species. It is a native of Jamaica, St. Domingo, Cuba, and Martinique, in damp places and by the side of streams. This is one of the most poisonous of plants. If the juice only accidentally touches the lips or eyes, it produces a burning inflammation.

HIPPOCRA'TEA, a genus of the natural family of *Hippocrateaceæ*, so named after Hippocrates, and which might therefore be expected to contain many useful or medicinal plants. But it is not so. The species consist of moderate-sized trees, which are found in the hot parts of the world, as in the tropical parts of America, in Sierra Leone, the warmer parts of India, and the island of Timor.

HIPPOCRATEA'CEÆ, a small natural order of exogenous plants. The species are woody, and often climbers; they inhabit Africa, the Mauritius, and the tropical parts of America. In general they are of no importance for economical or medical purposes. One species bears an eatable fruit, and another has oily seeds with sweet taste.

HIPPO'CRATES was born at Cos, B.C. 460. His family followed the pursuit of medicine for near three hundred years, and produced seven physicians, who attained considerable celebrity, and who are supposed to have written the numerous treatises which are commonly attributed to Hippocrates alone. Before their time the knowledge of medicine was either confined to the priests, who employed their skill in maintaining their influence over the people, and carefully concealed the little knowledge they possessed, or was merely followed as a subordinate pursuit by the philosophers of the day. It is to the Asclepiadæ that the science of medicine is indebted for a separate existence, and the great progress which it made in their hands after this separation sufficiently proves the wisdom of their proceeding.

The most celebrated of the family was the subject of the present notice, Hippocrates, the son of Heraclides and Phænárete, who is supposed to have been the author of this important revolution in medicine. His medical studies were pursued under the superintendence of his father and of Heródicus; and he is said to have had for his masters in philosophy Gorgias of Leontini, the celebrated sophist, and Demócritus of Abdera, whose cure he afterwards effected. We are told that he spent some time at the court of Perdiccas, king of Macedonia, and visited Thrace and Scythia; and it is probable that these statements are true, as mention is made in his writings of several towns in Thrace. (Suidas, *Ἱπποκράτης*.)

The principles of Hippocrates were those of rational empiricism. He did not attempt to form his theories from *à priori* reasoning, but he observed the phenomena of nature, and deduced from them such conclusions as these phenomena would justify. That he adhered to this principle in all cases however is not be supposed. He taught that the body is composed of four primary elements—fire, water, earth, and air; that these elements, variously combined, produce the four cardinal humours, and these again the different organs of the body. These doctrines are principally developed in the treatise 'On the Nature of Man.' His knowledge of anatomy seems to have been very limited. The superstitious respect which was paid to the remains of the dead among the Greeks prevented him from acquiring any knowledge on this subject by dissection of the human body. He gives such descriptions of the bones as show that he had indeed studied the subject, but not acquired any very accurate knowledge. In his pathology he confines himself principally to the investigation of the remote causes of diseases, without entering into any speculations on their nature. However, he explains inflammation by the passage of blood into those parts which did not previously contain it. He paid great attention to the effects of changes in the external conditions of life, namely air, warmth, moisture, food, upon its phenomena, and those of disease. He recommended that particular attention should be paid to the state of the seasons.

Among the doctrines of Hippocrates, that of critical days, upon which he supposed the evacuation of the morbific matter when concocted to take place, is the most remarkable. Of the indications to be drawn from examination of the pulse Hippocrates was not aware, and the word *sphygmus* (*σφυγμός*) is usually employed by him to denote some violent pulsation only. We must not forget that Hippocrates asserts that auscultation may be employed to distinguish between the presence of pus and serous fluid in the cavity of the pleura. The statement is in itself incorrect, but the fact of his having actually practised auscultation is no less interesting.

Hippocrates appears also to have introduced some valuable improvements in the treatment of disease. In fevers and acute diseases he confined his patients to a liquid diet, but not so strictly as some other physicians, whom he charges with starving their patients to death. In his general treatment he employed purgatives, some of which were of the most violent character, as the black and white hellebore and elaterium, which generally produce excessive vomiting at the same time. He mixed up a little theory with his treatment; for he would not allow purgatives to be employed unless the humours were duly concocted. To relieve the head in certain diseases he was accustomed to make use of sternutatories. In acute affections, when the disease was violent, he employed bleeding, and recommended that blood should be taken from as near the affected part as possible. This was the origin of the doctrine which recommended bleeding in pleurisy from the arm on the side affected. He also made use of cupping-glasses, with and without scarification. Certain diuretic and sudoritic medicines also entered into his pharmacopœia, and he was not ignorant of the virtues of the poppy.

In the time of Hippocrates the distinction between medicine and surgery had not been made, as we find among the works usually attributed to him in the list of Erotian, treatises on fractures, on ulcers, and on wounds of the head.

It appears that consultations were not unknown in the time of Hippocrates, for in the latter part of the 'Præcepts' he says that a physician ought not to be ashamed to call in the assistance of another, if he finds himself at a loss in the treatment of his patient. The oath which he administered to his pupils shows the high sense he had of the duties and responsibilities of a physician. The pupil is made to swear 'that he will reverence his teacher as a father, and his descendants as brethren; that he will use his art to the benefit of his patients, and never to their injury or death, even if requested by them; that he will never attempt to procure abortion, that he will be chaste, and never divulge any professional secrets.' Hippocrates wrote in the Ionic dialect, though the island in which he was born was originally colonised by the Dorians. His style is remarkably concise, so as to render his meaning at times somewhat obscure, and it would appear that he occasionally makes his statements too general, in order to avoid loading his writings with exceptions. The high estimation in which his works have been held is proved as well by the general reputation of his name, as more especially by the numerous commentaries upon them which have been published in all ages. His knowledge of anatomy and physiology, and of the processes which go on in the body during health and disease, was extremely deficient, but in the accuracy with which he observed the symptoms of disease, and in the fidelity of his descriptions, he has rarely, if ever, been surpassed. It is upon these grounds that he has justly obtained the title of 'the Father of Medicine,' and will at all times continue to command the respect of his medical descendants.

(Sprengel, *Histoire de la Médecine*, tom. i.)

HIPPOCRE'PIS, a genus of plants belonging to the natural order *Leguminosæ* and tribe *Hedysareæ*. *H. Balearica*, Minorca Horse-Shoe Vetch, is a native of the island of Minorca. It is a pretty plant, worthy of cultivation, but requires the greenhouse in winter. *H. comosa*, common Horse-Shoe Vetch, is a native of Europe, and is found on dry chalky banks in Great Britain. It is also found in the north of Africa.

There are seven or eight more species of Horse-Shoe Vetch. They are all worth cultivation on account of their beauty.

HIPPOLYTE-DU-FORT. [GARD.]

HIPPOMANE MANÇANILLA, the Manchineel-Tree, is a tree of very considerable size, and of a handsome aspect, belonging to the natural order *Euphorbiaceæ*, and among the most poisonous of all known vegetable productions. When the fruit is ripe, it is a fleshy yellowish green round body, very like a European crab-apple. The tree is common in the West India Islands, although pains have been taken to extirpate it. In some places it forms thick woods, as upon Sandy Island, near Tortola. The whole plant abounds in a milky juice of the most venomous description. Dropped on the skin, it produces a sensation of severe burning, followed by a blister; and the fruit, when bitten, causes dangerous inflammation of the mouth. According to Sir Robert Schomburgk, it is dangerous to sleep beneath the tree, and rain passing through the branches blisters the skin of a person below them. The wood of this tree is represented to be of fine quality, handsome, and well suited for cabinet makers' purposes.

HIPPO'PHAE, a genus of plants belonging to the natural order *Elæagneæ*. The only species of this genus is the *H. rhamnoides*, which is a small shrub found on the east and south-east coasts of Great Britain, and other parts of Europe. The acid berries yielded by this plant are often eaten as a salad both in this country and in France. This plant also yields a colouring matter, which is used for dyeing yellow. Although in this country the berries are innocuous, they seem to exert a deleterious influence, or are supposed to do so, in some of the countries of the south of Europe.

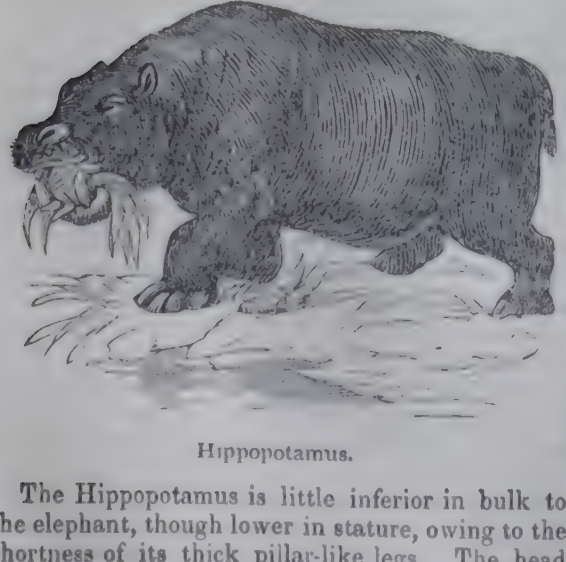
HIPPOPO'TAMUS, the Roman name for the River Horse (*ἱπποπόταμος* of the Greeks), and retained by modern zoologists as the generic appellation of a limited group of bulky pachydermatous animals, restricted in the present day, as far as we know, to Africa.

'The Hippopotami,' says Cuvier, 'have four toes on each foot, nearly equal, and defended by small hoofs; six grinders on each side above and below, of which the first three are conical, the posterior three crowned with two pairs of bold elevations, which wear down by attrition, when the form of a trefoil is exhibited on their crowns; four incisors in each jaw, of which the uppermost are short, conical, and recurved, the inferior are long, cylindrical, pointed, and directed obliquely forwards; one canine on each side above and below, the superior is straight, the inferior very massive and recurved, both wearing themselves by attrition against each other. These animals have the body

very massive, destitute of hair, the limbs very short, the belly almost dragging on the earth, the head enormous, terminated by a large swollen muzzle which covers the array of their huge anterior teeth. The tail is short, the eyes and the ears small. The stomach is divided into several sacculi. They tenant rivers, feeding on roots and other vegetable matters, and display much ferocity and stupidity.' (Régne Animal.)

Elsewhere Cuvier remarks that there is no animal that requires to be more studied at different ages than the Hippopotamus, in order to acquire a perfect knowledge of the molar teeth, which change their form, their number, and their position: and, in his 'Ossemens Fossiles,' he goes into minute details of their changes.

When Cuvier wrote, only one living species of Hippopotamus was known. M. Desmoulins however, from examination of skulls and bones from South Africa and from Senegal, has demonstrated that there are certainly two, which are respectively designated *H. Capensis*, and *H. Senegalensis*. Moreover he suggests that the Hippopotamus of the Nile may possibly be distinct from either of these. Be this as it may, in habits, manners, and form, the Hippopotami of all parts of Africa agree with each other. They inhabit the banks and beds of the larger rivers and the inland lakes of Africa, from the Gariep to the upper Nile and its tributary branches. It is not however exclusively restricted to fresh waters, for it is marine as well as fluviatile; and Dr. Smith thinks it difficult to decide whether it gives preference to the river or the sea for its abode during the day. When the opportunity of choosing the river or the sea existed, he found that some selected the one and some the other.



Hippopotamus.

The Hippopotamus is little inferior in bulk to the elephant, though lower in stature, owing to the shortness of its thick pillar-like legs. The head is ponderous, and the great thick lips are studded with wire-like bristles. The mouth is wide; the nostrils open on the top of the swollen muzzle; and the small eyes are situated high on the head; hence by raising only a small section of the head above the surface of the water, the animal can breathe and look around, the body remaining submerged. The hide is of immense thickness, being upwards of two inches deep on the back and sides; it is extremely dense, and is manufactured by the natives of various districts, both of northern and southern Africa, into shields, whips or scourges, and other articles. Between the skin and the flesh a layer of fat intervenes, which is salted and eaten as a delicacy by the Dutch colonists of South Africa, by whom it is termed Sea Cow's Speck (bacon). The flesh also is said to be excellent.

The general colour of the Hippopotamus is dusky brownish red, passing on the sides and limbs into a light purple red or brown; the under parts, the lips, and the eyelids are light wood-brown with a tinge of flesh colour; the hinder quarters are freckled with spots of dusky brown. The hairs which fringe the tail and ears are black, the bristles on the muzzle yellowish brown. The male considerably exceeds the female in size. The period of gestation is not ascertained. A single young one only is produced at a birth.

The Hippopotamus is to a great extent nocturnal in its habits; during the day it remains under its fluid canopy, rising every 5 or 6 minutes for the purpose of respiration. At night, it comes on land to feed, at least in districts fully inhabited by man, and often travels to a considerable distance in quest of some favourite diet. It visits the plantations of grain, trampling down as much as it consumes, and doing great damage. Burckhardt states that in Dongola it is a dreadful scourge to the inhabitants, who lack the means of destroying it.

The Hippopotamus is wary, and indisposed to act on the offensive, yet, in districts where the sound of a musket is seldom heard, it shows but little fear of man. When attacked and wounded, the Hippopotamus becomes exceedingly furious, and, if on land, rushes open-mouthed on its aggressor. But the danger from the vengeance of this animal to boats and their crew on the water is far greater. Captain Owen had some serious encounters with these animals ('Narrative of Voyages to explore the shores of Africa'), in which his men had narrow escapes. While examining a branch of the Tenby River in Delagoa Bay, a violent shock was suddenly felt from underneath the boat, and 'in another moment a monstrous hippopotamus reared itself up from the water, and in a ferocious and most menacing attitude rushed open-mouthed at the boat, and with one grasp of its tremendous jaws seized and tore seven planks from her side; the creature disappeared for a few seconds, and then rose again, apparently intending to repeat the attack, but was fortunately deterred by the contents of a musket discharged in its face. The boat rapidly filled, but, as she was not more than an oar's length from the shore, the crew succeeded in reaching it before she sank. The keel in all probability had touched the back of the animal, which irritating him occasioned this furious attack; and, had he got his upper jaw above the gunwale, the whole broadside must have been torn out. The force of the shock previously to the attack was so violent that her stern was almost lifted out of the water, and Mr. Tamb the midshipman steering, was thrown overboard

but was fortunately rescued before the irritated animal could seize him.'

According to some authorities, as Hasselquist, the Hippopotamus is an inveterate enemy to the crocodile, and kills it whenever he meets with it, but there is reason to believe this statement to be erroneous. Were the statement correct, what a life of warfare would the animal lead! While Salt and his party were engaged shooting at the Hippopotami, they frequently observed several crocodiles of enormous size rise together to the surface of the same stream, regardless of and disregarded by their still more enormous neighbours. Captain Tuckey, in his expedition to explore the Zaire or Congo, observed immense numbers of Hippopotami and crocodiles in the same waters, an association inconsistent with hostility. The voice of the Hippopotamus when exerted is a harsh cry, between bellowing and neighing, and this it utters when excited or alarmed. For interesting details, far too long to quote, respecting adventures with this animal, let the reader consult the various travels in Africa which have been published since the time of Sparrman to the present day, especially those relative to the interior of southern Africa, the exploration of the Niger, the Zaire or Congo, and of the upper part of the Nile and its tributaries in Nubia and Abyssinia. The Hippopotamus abounds in the Lake Muggaby, Bornou, and in the great Lake Tchad and its tributary branches. (See Dr. Smith, Lander, Burckhardt, Clapperton, and others.)

We need not attempt a laboured exposition to prove that the Hippopotamus was known to the ancients, although it may be admitted that some of the descriptions of the older writers, as Herodotus, Aristotle, Diodorus, and others, are more or less incorrect. Scaurus, during his ædileship, exhibited one of these animals at Rome. Augustus exhibited one on his triumph over Cleopatra, and at subsequent periods under the later emperors they were introduced into the Roman amphitheatre. Commodus shewed five on one occasion. The Hippopotamus is very tolerably delineated on the Prænestine Pavement.

Fossil Hippopotami.

The remains of fossil Hippopotami occur abundantly in the tertiary series. They are most common in the Pliocene period of Lyell, and are frequently met with in the superficial beds of gravel, clay, and sand, termed by some diluvial, in the ossiferous caverns, osseous breccia, &c. They are also found in some of the beds of the Miocene period.

HIPPURIC ACID, an acid obtained from the urine of cows and horses, and somewhat analogous in character to benzoic acid. Its composition is $C^{9}\ H^{9}\ O^{6}\ N^{1}$. Its combinations with other bodies have not been extensively examined.

HIPPU'RIS, a genus of plants belonging to the natural order *Haloragæ*. Three species of this genus have been described. Of these, *H. vulgaris*, the common Mare's Tail, is found abundantly throughout Europe and North America. It is found in ditches and lakes, and is very common in Great Britain in stagnant waters and slow streams.

HIPPURITES (in Zoology), a name given by Knorr and Schroeter to a fossil coral (*Cyathophyllum cratites*, Goldfuss) of the Eifel transition limestone. Guettard also used this title for a lamelliferous coral. By Lamarck, Defrance, and other writers, this name is given to a somewhat problematical group of fossils found in limestones of the oolitic age which flank the Alps in the Untersberg, near Salzburg, at Regensburg, &c., in the chalk of Perigord, Alet, &c. Lamarck places Hippurites with Belemnites and Orthoceratites, among the Cephalopoda. ('Conchyliologie,' in 'Nouv. Dict. des Sciences Nat.') Latreille takes nearly the same view. ('Familles Naturelles du Règne Animal.') Rang introduces the genus among the *acephalous Rudista* (singular bivalve shells), according to the views of De Blainville.

HIPTAGE, a genus of plants of the family of *Malpighiaceæ*, better known by the name *Gartnera*. The genus contains only two species: one, *H. Madablota*, which is common in the forests of many parts of India; the other, *H. obtusifolia*, is found in China, but commonly cultivated as an ornamental plant in India.

HIRCIC ACID, obtained from goat's fat, is a liquid at a temperature of 32°: it is lighter than water, smells of the goat, is insoluble in water, and forms soluble salts with potash and barytes.

HIRCIN, a principle similar to butyrine, which exists in goat's fat and in mutton suet, combined with olein.

HIRE, LA. [Lahire.]

HIRT, ALOYSIUS, was born at Bela, in Baden, June 27, 1759. In early life he visited Italy, and studied the remains of classic art there, and on his return settled at Berlin, having been appointed preceptor to Prince Henry of Prussia. In 1796 he became professor of architecture and the fine arts at the Academy of Berlin, and was subsequently made professor of archæology at the University of Berlin. Among his numerous publications are several special disquisitions on particular structures, such as the Temple of Solomon, the Temple of Diana at Ephesus, and the Pyramids of Egypt; but those by which he will be most generally and longest known are his 'Baukunst nach den Grundsätzen der Alten,' 1809, and his 'Geschichte der Baukunst bey den Alten,' 1821–7, 3 vols. 4to., with a folio atlas of plates. Hirt died at Berlin June 29, 1837, just two days after entering his seventy-eighth year.

HIRTIUS, AULUS, born of a patrician Roman family, applied early to the study of rhetoric, and became intimate with Cicero, who speaks highly of his oratorical talents. He is generally supposed to be the author of the eighth book of the 'Commentaries' (Suetonius, 'Life of Cæsar,' c. 56), as well as of the books of Cæsar's Alexandrine and African campaigns, which are avowedly written by the same person as the eighth book of the Commentaries. Hirtius remained attached to Cæsar till his death, after which he took the part of the senate against M. Antonius, and was named consul with C. Vibius Pansa. The two consuls had an engagement with Antonius, whom they defeated near Mútina (Modena), B.C. 43, but Hirtius was killed in the battle.

HIRUNDINIDÆ. [Swallows.]

HISPANIA. [Spain.]

HISPANIO'LA, *Hispañola, Española* (*i. e.* Little Spain), known also under the names of SAINT DOMINGO and HAITI, is one of the Great Antilles or larger islands of the West Indies. It extends from 68° 30′ to 74° 30′ W. long. Its length is about 360 miles. It lies between 18° and 20° N. lat.; but a promontory on the southern coast projects about 20′ beyond 18° N. lat. The area is about 25,000 square miles.

Hispaniola is the most fertile island in the West Indies. Its surface exhibits a great variety on rather a large scale. Near the centre of the island there is a mountain-knot, called Cibao, whose elevation it is thought does not fall short of 8000 feet. Ranges of mountains, which rise from 2000 o 5000 feet, occupy the greater part of the island, but contain between them extensive valleys and plains. In the eastern part of the northern plain are extensive savannahs, or natural meadows; but towards the west the soil is fruitful. At the eastern extremity is the lake called Laguna de Henriquillo, which is 50 miles in circuit. The country is well watered by numerous rivers.

The coast, which is about 1200 miles in length, has a great number of harbours, some of which are spacious, deep, and safe. Near Cape St. Nicolas is the port of St. Nicolas, which is 6 miles long, and capable of holding a large fleet. The harbour of the town of St. Domingo is a very indifferent one.

The climate of Hispaniola differs considerably from that of the other Antilles. In July begin the abundant rains on the south coast which continue through August, September, and October. The winter is rather cool, the thermometer rarely exceeding 70°, and still more rarely descending below 60°. The northern coast has only showers during August, September, and October, but in December and January the rains descend in torrents: afterwards they are moderate, and cease entirely in April. The heat of the summer is moderated by the prevailing northern winds. Hurricanes are frequent on the southern coast, but they occur rarely on the northern shores.

Fifty years ago, Hispaniola was noted for its extensive plantations of sugar, coffee, and cotton, but they have now almost entirely disappeared, except those of coffee, which are much reduced. The principal commercial wealth of the island is derived from the forests which cover the greatest part of the mountains. The timber consists chiefly of mahogany-trees and different kinds of dye-woods.

The aborigines are now extinct, but a considerable part of the present population consists of their descendants, mixed with the blood of Europeans and negroes. The number of mulattoes, or descendants of Europeans and negroes, is still greater; indeed they may be considered as constituting the nation. The population is stated to be not less than 1,200,000.

Port au Prince, the capital and seat of government, is situated between the large plain of Cul de Sac and a more narrow one extending along the southern shores of the Bay of Gonaves. The streets are sufficiently wide and commodious. Its commerce with the United States and with Jamaica is considerable. The population is estimated at about 30,000. S. Domingo, on the southern coast, is the oldest European establishment in America, having been founded by Columbus in 1504. The population is about 15,000.

Hispaniola was discovered by Columbus, and was possessed by Spain until 1697, when the western part of it was ceded to France. In 1794 the negro slaves were declared free by the French National Convention, and shortly afterwards the negroes rose against their European governors, under Toussaint l'Ouverture, Dessalines, and Christophe, and at length succeeded in establishing a monarchy in the northern parts under Christophe, and a republic in the western under Petion. On the death of Christophe (who killed himself during an insurrection) in 1820, the whole became united into one republic, and has so continued, although in a frequently disturbed state.

HIVE. [Bee.]

HOADLEY, BENJAMIN, born 1676, died 1761, was successively bishop of Bangor, Hereford, Salisbury, and Winchester.

He is to be regarded, 1st, as a principal writer among the divines of the English Church who are called Rational, that is, who have renounced the whole of what constitutes proper Calvinism, and have advanced more or less near to the opinions which are comprehended under the term Unitarianism; 2nd, as the great advocate of what are called Low Church principles, a species of Whiggism in ecclesiastics. It was out of a sermon of his upon the text, 'My kingdom is not of this world,' that the celebrated Bangorian controversy arose.

A full account of bishop Hoadley is given in the 'Biographia Britannica.'

HOADLEY, BENJAMIN, M.D., eldest son of Bishop Hoadley, was born Feb. 10, 1705, in London. He was admitted of Corpus Christi College, Cambridge, April 8, 1722, and received his degree of M.D. in 1729. In June 1742, he was appointed physician to his Majesty's household, and in January 1746 was also appointed physician to the household of Frederic, Prince of Wales. He was the author of 'Three Letters on the Organs of Respiration,' read at the Royal College of Physicians, London, 1737, being the Gulstonian Lectures for that year; 'Oratio Anniversaria in Theatro Col. Medicor. ex Harveii instituta, habita die 18mo Oct. 1742;' 'Observations on a Series of Electrical Experiments,' 1756, 4to. Dr. Hoadley is now known chiefly as the author of the comedy of 'The Suspicious Husband,' 1747, in which Garrick was distinguished for his performance of Ranger. Dr. Hoadley died Aug. 10, 1757, in his house at Chelsea.

HOANG-HAI, or WHANG-HAI, *The Yellow Sea*, is a large sea, which runs into the eastern coast of Asia, being inclosed on the west and north by China Proper, and on the east by the peninsula of Corea; on the south it is open, and united to the Pacific Ocean. It lies between 34° and 41° N. lat., and extends from 117° 14 to 127° E. long.

The northern portion extends in length from west to east somewhat more than eight hundred miles from the shores of the Gulf of Petcheli, near

the mouth of the river Peiho, to the coast of Corea, at the back of James Hall's Island. It is nearly divided by the projecting peninsula of Leao-tong into two basins. The most western of these basins contains the gulfs of Petcheli and Leao-tong, which have a few good harbours, and soundings of moderate depth: there are several very small islands. The eastern basin is very little known to Europeans, but it is supposed to have many islands, and generally moderate soundings.

The southern portion is at its southern extremity, between the mouth of the river Hoang-Ho and the south-west cape of Corea, nearly seven hundred miles wide, but grows narrower as it proceeds north, being near its northern boundary hardly more than two hundred miles across. It is studded with many islands, and its water, like that of the northern portion, is yellowish (whence the name), derived from the colour of the mud at the bottom.

Though the Yellow Sea is not visited by European vessels, navigation is very active, as it washes the shores of a populous and industrious part of China.

HOANG-HO. [Yellow River.]

HOARE, WILLIAM, R.A., an historical and portrait painter, born at Bath about the year 1706. He studied at Rome nine years. There is an altar-piece by Hoare, of Christ bearing the Cross, in the church of St. Michael at Bath; and another of the Lame Man healed at the Pool of Bethesda, in the Octagon Chapel, for which he received 100*l.* and a pew in the chapel. He was one of the original members of the Royal Academy. He died at Bath in 1792.

HOARE, PRINCE, who succeeded Boswell as foreign secretary to the Royal Academy, was the eldest son of William Hoare; he was professionally a painter, but is known as the author of about twenty dramatic pieces, among which are—'No Song, no Supper;' 'Lock and Key;' My Grandmother,' and other lively farces. He published, in 1806, 'An Inquiry into the requisite Cultivation and Present State of the Arts of Design in England,' 8vo., p. 270. He died at Brighton in 1834, aged 80.

HOARE, SIR RICHARD COLT, Baronet, was born the 9th of December, 1758, and died the 19th of May, 1838. In 1783 he married the eldest daughter of Lord Lyttleton, and she died in 1785, leaving one child, Henry. His father was the first baronet, and in 1787 he succeeded to the baronetcy. He travelled abroad for some years, and published the results in 1818, under the title of 'A Classical Tour through Italy and Sicily.' In 1806 he published a translation of Giraldus, with views, annotations, and a life of Giraldus. In 1807 he visited Ireland, and published a short account of his excursion. But it is as the historian of Wiltshire, his native county, that Sir R. Colt Hoare's reputation is best established. A catalogue of works printed for private circulation by Sir R. Colt Hoare is given in the 'Gentleman's Magazine' for July 1838.

HOBART-TOWN. [Tasmania.]

HOBBES, THOMAS, was born at Malmesbury, Wiltshire, on the 5th of April, 1588, and was the son of a Protestant clergyman of that town. After he had gone through the usual university course at Oxford, he became in 1608 private tutor in the family of Lord Hardwicke, afterwards Earl of Devonshire. In 1610 he went abroad with his pupil Lord Cavendish, and made the tour of France and Italy. His translation of Thucydides, which was revised by Ben Jonson, was published in 1628. The Earl of Devonshire and his eldest son having died, Hobbes went with the new earl first to Paris, where he enjoyed the friendship of Father Mersenne, and applied himself much to the study of natural philosophy, and afterwards to Italy, where he became known to Galileo. He returned to England in 1637. Shortly afterwards he applied himself to the composition of his 'Elementa Philosophica de Cive,' a few copies of which were printed in Paris in 1642.

Shortly after the meeting of the Long Parliament, Hobbes had withdrawn himself to Paris. He became acquainted here with Descartes, and he also acquired the friendship of Gassendi.

In 1647 Hobbes was appointed mathematical tutor to the Prince of Wales, afterwards Charles II. Hobbes's two small treatises, entitled 'Human Nature' and 'De Corpore Politico,' were published in London in 1650, and in the following year the 'Leviathan.' He caused a copy of his last work to be written on vellum and presented to Charles; but the Prince, yielding to the opinion of several divines, thought it right to withdraw his favour from Hobbes, though he always spoke of him with the utmost kindness, and after the Restoration granted him a pension of 100*l.* a year.

After the publication of the 'Leviathan,' Hobbes returned to England. In 1666 his 'Leviathan' and 'De Cive' were censured by parliament. Shortly afterwards Hobbes was still further alarmed by the introduction of a bill into the House of Commons for the punishing of atheism and profaneness. In 1669 he received a visit from Cosmo de' Medici, afterwards duke of Tuscany, who honoured him with many presents, and asked in return for his picture and a complete collection of his writings, the former of which he deposited among his curiosities, and the latter in his library at Florence. He received many similar visits from foreigners of distinction.

In 1672 Hobbes wrote his own life in Latin verse, being then in his eighty-fifth year; and in 1675 he published his translation in verse of the Iliad and Odyssey. Hobbes had now retired to the Earl of Devonshire's seat in Derbyshire; but, notwithstanding his advanced age, he still continued to write and publish. His 'Dispute with Laney, bishop of Ely, concerning Liberty and Necessity,' appeared in 1676; and in 1678 his 'Decameron Physiologicum, or Ten Dialogues of Natural Philosophy;' to which was added, a book entitled 'A Dialogue between a Philosopher and a Student of the Common Law of England.' In 1679 he sent his 'Behemoth, or a History of the Civil Wars from 1640 to 1660,' to a bookseller, with a letter in which he requested him not to publish it until a fitting occasion offered. It

appears from this letter that Hobbes, being anxious to publish the book some time before, had with that view shown it to the king, who refused his permission. It appeared however almost immediately after Hobbes's death, which took place December 4, 1679, in his 92nd year. Hobbes may be considered the father of English psychology, as well as the first great English writer on the science of government.

HOBBIMA, MINDERHOUT, one of the most eminent of the Flemish landscape painters, was born at Antwerp, about the year 1611. It is not known nor, we believe, conjectured by whom he was instructed, but his works evince the most assiduous and successful study of nature. His subjects are in general simple country scenes. The largest and, in the opinion of Dr. Waagen, the finest of his works, is in the possession of Lord Hatherton, who has refused 3000*l.* for it.

HOCHE, LAZARE, born in 1768 near Versailles, of very humble parentage, enlisted in the French Guards at the age of sixteen. During the revolutionary war he served in Flanders as a lieutenant under Dumouriez. Having distinguished himself, he was rapidly promoted, and at the age of twenty-four was made general in command of the army of the Moselle. Upon incurring the displeasure of St. Just, he was thrown into prison at Paris, when his life was saved by the timely overthrow of Robespierre in July 1794. The Convention restored him to his rank, and sent him against the insurgents of La Vendée. By a decree of the Directory, July 1796, he was declared to have well deserved of his country.

Hoche now conceived the bold idea of effecting a landing in Ireland, and, a fleet having been equipped at Brest with great secrecy, he embarked his troops in December 1796 ; but, being separated by a storm from the rest of the fleet, he was obliged to return to France without effecting anything.

In the quarrel which took place between the Directory and the Legislative Councils, Hoche took the part of the Executive, and began to direct some of his forces towards Paris in order to support the Directory. For this he was denounced by the Councils, and, Bonaparte meantime having offered the support of his own army of Italy, the Directory declined Hoche's services, and made use of Augereau to effect the coup-d'état of Fructidor. Hoche returned to his head-quarters at Wetzlar, where he was seized by a sudden illness, of which he died September 15, 1797. The symptoms of the disease give rise to suspicions of poison. His life has been written by Rousselin, in 2 vols. 8vo.

HODDESDON. [HERTFORDSHIRE.]

HODGES, WILLIAM, R.A., was born in London about the year 1744. His father was a blacksmith. He was a pupil of Wilson.

In 1772 Hodges accompanied Captain Cook as draftsman on his second voyage to the South Seas; and his drawings were published in Cook's narrative. He then went to India, where he realised a considerable fortune. He was elected a member of the Royal Academy in 1787. About 1790 he made a tour on the continent of Europe, and exhibited a view of St. Petersburg at the Royal Academy in 1793. In 1795, he established a bank at Dartmouth in Devonshire, which broke two years afterwards. The shock brought on the death of Hodges, March 6, 1797.

In style Hodges imitated Wilson, but with little success. His best works are—a view of Windsor from the Great Park, and three or four views painted in India.

HODY, HUMPHREY, D.D., was born Jan. 1, 1659, at Oldcombe, in Somersetshire. He was educated at Oxford, took his degree of M.A. in 1682, and was elected in 1684 a fellow of Wadham College. The works by which Hody was principally known among his contemporaries were those which he published respecting the bishops who had been deprived of their bishoprics during the reign of William and Mary for refusing to take the oath of allegiance. In 1693 Hody published 'The Case of Sees vacant by an Uncanonical Deprivation' (4to., Lond., 1693). He was appointed domestic chaplain to Tillotson, archbishop of Canterbury, which office he also held under his successor. He was presented with a living in London, and was appointed regius professor of Greek at Oxford in 1698, and archdeacon of Oxford in 1704. He died on the 20th of January, 1706.

He founded ten scholarships at Wadham College, in order to promote the study of the Greek and Hebrew languages.

HOE, HORSE-HOEING. The hoe is an instrument used in gardens and in the fields for loosening the earth, and destroying the weeds between plants. It has various forms. The most common hoe consists of a blade or flat piece of iron, with an eye in which an handle is inserted at an acute angle with the plane of the blade. This hoe is used by striking the edge of it down into the ground, and the earth is moved by drawing the handle towards the workman. Another hoe has the handle at a very obtuse angle, and is used by pushing it forward and cutting off the weeds an inch or less under the surface of the ground. Hoes are made of different sizes and shapes according to the work which is to be done. When the earth is to be stirred between plants which are very near each other, the hoe is narrow and pointed, so that the smallest weed may be taken out close to the growing plant. When the distance is considerable, the hoe is wide, and sometimes compounded of several hoes, in order to stir a greater width of earth at once.

One of the greatest improvements in practical agriculture has been the introduction of the hoe into the field for every kind of crop. Peas and beans were probably the first crops which were sown in rows for the purpose of hoeing the intervals ; potatoes, turnips, and carrots were probably the next, and the good effects produced on these crops, by stirring and hoeing the intervals between the plants, have led to the drilling of every other kind of produce which is apt to be injured by weeds. Hand-hoeing not having been found sufficiently expeditious on a large scale, a hoe has been invented of a larger form, to be drawn by a horse. The rows have in consequence been widened, and this has introduced the horse-hoeing

husbandry, which, half a century ago, was thought so important a discovery as to receive the name of the New Husbandry. The greater promoter of this system was Jethro Tull. [TULL, JETHRO.]

The simple horse-hoe is an instrument with a beam like a plough, and two stilts or handles, but much lighter; in this beam is inserted, instead of a coulter, the end of an iron hoe, of the proper breadth to stir the whole surface between the rows. A small wheel is generally added to keep the hoe at a proper depth in the soil.

A variety of horse-hoes have been invented of more or less complicated forms; but the object of them all is the same, viz. to stir the ground between the rows, and destroy the weeds as fast as they appear. The horse-hoe is now chiefly used in the cultivation of peas, beans, potatoes, cabbages, turnips, and carrots.

The effect of hoeing is remarkable in very dry weather. Although the stirring of the soil would seem to extract what little moisture there might be in it, and the weeds wither on its surface, it soon appears that, on the contrary, moisture is attracted or produced, and the plants which drooped before appear refreshed and invigorated.

The operation of hoeing cannot be performed too soon after the plant has shot out its roots, because the ground may then be stirred very near the young plant without danger, and the roots will spread readily in the newly stirred soil.

The best time for hoeing stiff soils is when they are neither wet nor dry; when the surface is slightly caked, but there is moisture below it, and when the weather is dry after some rain. Light soils can be hoed at any time, and require it oftener than the heavy, especially in showery weather.

HOERBERG, PEHR, a Swedish painter, was born in a village of Småland, in 1746; his father was a private soldier and extremely poor. By the time he was 22 years of age, he contrived to learn so much from one painter and another in his own district, that he was enabled to maintain himself and a wife by his paintings. In 1784, in his thirty-eighth year, he became a student in the Royal Academy of Arts at Stockholm, in which he obtained two prizes, and made rapid progress. In 1790 he established himself at Olstorp in East Götaland, and in 1797 he was elected a member of the Swedish academy, and was appointed historical painter to the king. He died in 1816.

There are 87 altar-pieces by Hoerberg in Sweden, five of which are copies; his paintings altogether amount to about 700, mostly religious.

HOFFMANN, FRIEDRICH, was born at Halle in Saxony, in 1660, of a family which had been engaged for two centuries in the practice of medicine. After having graduated and received his diploma at Jena, he established himself as a physician at Minden in 1682. In 1684 he travelled through Holland and England, and on his return was appointed physician to Frederick William, elector of Brandenburg, and to the garrison of Minden. In 1688 he removed to Halberstadt, and, having gained considerable celebrity both by his successful practice and his writings, he was invited by Frederick III., elector of Saxony, afterwards king of Prussia, to take the chief professorship of medicine in the University of Halle, which had just been founded. He accepted this appointment in 1693, composed the statutes of the Institution, and retained the professorship with a reputation scarcely inferior to that of his great colleague Stahl, till 1742, the year in which he died. As a practical physician Hoffmann enjoyed a celebrity second only to that of Boerhaave, who was the contemporary professor of medicine at Leyden. His works were well known and esteemed throughout Europe, and he was admitted a member of the scientific societies of London, Berlin, Petersburg, and other cities. He was a very voluminous writer. Hoffmann's knowledge of chemistry and pharmacy was extensive, and we owe to him the discovery and first introduction of the Seidlitz waters and the purgative salt obtained from them.

The best edition of his complete works is that published at Geneva in 1748, in 6 vols. folio; and his best treatises are the 'Medicina Rationalis Systematica,' which occupies the first 3 volumes, and the 'Consiliarii Medici.'

HOFFMANN, CHRISTIAN GOTTFRIED, was born in 1692 at Lauben, in Upper Lusatia. In 1718 he was made professor of law at Leipzig, and afterwards appointed to the chair of the same faculty at Frankfort-on-the-Oder. Among his works are 'Historia Juris Romano-Justinianei,' and 'Introductio in Jurisprudentiam Canonico-Pontificiam.' He died in 1735.

HOFFMANN, ERNST THEODOR WILHELM (or AMADEUS, the name he assumed instead of Wilhelm), one of the most original or rather perhaps eccentric writers of Germany, was born Jan. 24, 1776, at Königsberg, in East Prussia. Soon after his birth his father and mother separated, and he was brought up by an uncle, by whom he was induced, against his inclination, which led him to the cultivation of music and drawing, to study the law. From 1796 to 1800 he continued to prosecute his studies with great diligence in the courts at Glogau in Silesia and in Berlin, still however pursuing his favourite studies at every possible interval. In March 1800, he was appointed assessor to the government of Posen, and thence, through the patronage of General Zastrow, removed to be a judge at Plock in Poland in 1802, and to Warsaw in a similar capacity, in 1803. Hoffmann was an excellent magistrate, and highly esteemed in Warsaw, but, on the entry of the French troops into that town in 1806, he found himself at once without employment, without fortune, and without the prospect of any office in his then distracted native country. He determined boldly to make his other acquirements serviceable to his support. He wrote musical articles for the 'Allgemeine Musicalische Zeitung,' of Leipzig, and accepted in 1808 the situation of musical director of the theatre at Bamberg. Afterwards, in 1813, he filled the same office to the Dresden theatre till 1815. After the downfall of Napoleon and the complete restoration of the Prussian kingdom, he was, upon petition, readmitted as judge, and soon afterwards appointed to a seat in

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the royal justiciary court at Berlin, which he filled with great credit to himself as a judge till his death on July 21, 1822.

Hoffmann was small and weak of body, but for many years he laboured with extreme ardour. Besides his professional acquirements, which were highly estimated by his colleagues, he composed the music and text of many operas: the first was the music only to Göthe's 'Scherz, List, und Rache' (Jest, Trick, and Revenge), which was performed at Posen in 1800. He also produced a number of caricatures, highly popular at the time, of the foreign invaders of his country, and especially of Bonaparte. His first series of tales appeared at Bamberg in 1814, 'Phantasiestücken in Callots Manier;' and similar tales were continued even on his death-bed. They are all distinguished by a fertile wildness of imagination, considerable humour, vivid descriptions of the beauties of nature, much insight into the inconsistencies of the human character, and sly sarcasm. His works form 15 vols. in 18mo., of which a portion have been translated into French; but only two, 'The Sandman' and 'St. Sylvester's Night,' which appeared in 'Blackwood's Magazine,' have been rendered into English.

HOFWYL, the name of the estate on which was established the educational institution of Mons. de Fellenberg. It is situated in a valley about three leagues from Berne, in Switzerland, and consists of a number of distinct buildings surrounded by about 250 acres of land. The founder had for his object the improvement of the condition and character of all classes of society by means of an education adapted to their respective wants. To effect this, he divided the institution into classes, of which the higher, the sons of wealthy parents, paid a large yearly sum; the second class, a smaller sum; and the lowest class was received without payment. All were instructed in agriculture and the trades connected therewith, all of which were practised on the estate. All the classes also were instructed in the usual branches of school education, and the lower class in the sciences connected with agriculture; but these were carried farther in the second class, and the highest class had a still wider range. The upper class was commenced with in 1808, the lowest was added in 1810, and the middle class was not introduced till 1830. Fellenberg was enthusiastic, and succeeded in imparting much knowledge to his pupils, of whom he had usually about 100 who paid stipends, and 100 who were boarded, clothed, and educated for their labour. Fellenberg died in 1844, lamented and respected. The school is still carried on, and has about 40 scholars of the first class, and 70 of the second, many scholars of these classes being English; of the third class the number is still continued at 100. It was Fellenberg's wish to have his institution adopted by the state, but this has not been done.

HOG. [SUIDÆ.]

HOG. The wide dispersion of the domestic hog, and its usefulness to man, need no comment. It is omnivorous, and thrives on every kind of food, vegetable or animal. The sow bears two litters in the year, each litter consisting of eight, ten, twelve, or fourteen young, sometimes more.

There are many varieties of the domestic hog, and many of the older breeds closely resembled the wild animal, their primitive origin; their size was large and their flesh good, but they laid on fat slowly; a great fault, since the more rapidly the hog fattens, and the earlier he can be made to increase in flesh, without increasing in bone, the greater is the advantage to the breeder. The small original Chinese breed is remarkable for this quality, and also for productiveness; and, when by judicious crossing the size is increased, a great point is attained. The Chinese pig is short in the head, with ears pricked up and pointing backwards, very wide in the cheek, high in the chine, and short in the leg; the young pigs make delicate roasters at a month old, and, when dairy-fed, excellent porkers at about three months old. Pure Chinese pigs however are now rarely seen; the strain is intermixed with that of others.

The breed in this country nearest to the Chinese is the Suffolk. These pigs are generally white, with pointed ears, broad chest and loin, and a compact outline. The suckling roasters and the porkers are excellent, and they make fine bacon hogs at 12 or 15 months old.

The Essex breed approaches the Neapolitan, and is probably derived from the latter. Some are black and white, but the pure breed is black. This breed is admirable, and, when directly crossed with the Neapolitan, produces an intermixed progeny of superior qualities, fattening at an early age, and to an astonishing degree, with delicacy of flesh. The true Neapolitan hog is black, without any hair, very plump, with sharp ears. No breed can excel it in the aptitude to fatten; but it is tender, and winter litters are liable to perish from cold. It is very valuable as a cross with some of our hardier sorts, especially with the Berkshire, a noted race in the present day in consequence chiefly of this admixture of blood. Indeed, a mixture of the Berkshire, Chinese, and Neapolitan breeds may, by careful selection, and attention to the principle of not interbreeding in one strain too far, be brought to the highest degree of perfection.

Colour is chiefly a matter of fancy, but black pigs have the thinnest skin, and suffer less from the sun in summer, and hence they are less liable to cutaneous diseases.

With regard to the large gaunt unthrifty hogs of no definite breed, of 'no mark or likelihood,' which are still sometimes to be seen, and which some even recommend, we shall say but little. They feed slowly, are put up to fatten at 18 or 20 months old, and then when killed weigh 30 or 40 score—truly a great weight; but, then, will the delicacy of the bacon command so high a price as to repay the feeder for his long months of outlay, even taking weight into consideration? Let the breeder and feeder calculate. The flesh of delicate bacon-hogs killed at twelve months old and weighing 10 or 12 score, is far superior and sells better, with an additional gain in time and quantity of food.

In order to manage hogs profitably, a regular

system must be pursued. Proper sties for breeding sows, boars, feeding-hogs, and porkers, must be constructed, with due attention to comfort and cleanliness. Regularity in feeding, attention to the quality of the food, according to the purpose designed, increasing it from less nutritious articles to a full diet, from boiled potatoes mixed with bran to pea-meal, barley meal, skimmed milk, &c. are points of importance. Conveniences, as boilers and outhouses, for the preparation and storing of food, are also essential, and so is due cleanliness of the troughs. For more complete information on these points, as well as on the diseases to which the hog is liable, see the article 'Hog,' in the 'Farmer's Library.'

HOGARTH, WILLIAM, was born in London, in 1697. His father, Richard Hogarth (or Hogart), died in 1721, leaving two daughters and one son, William. Of William Hogarth's education nothing has been recorded; but we may conclude that it was slight, from the frequency of his errors in grammar and orthography.

It was at his own wish that he was apprenticed to Ellis Gamble, a silversmith in Cranbourn Street, London; but he soon found this business too limited, and its scope insufficient for his fancy. In 1718 Hogarth ceased to be an apprentice, and attended Sir James Thornhill's academy in St. Martin's Lane, where he studied drawing from the life. His livelihood was earned by engraving arms, crests, &c., until 1724, when he published his first original engraving, now called the 'Small Masquerade Ticket, or Burlington Gate.' Illustrations to Mottraye's 'Travels,' 'Hudibras,' and other books, were supplied by him in 1725 and the following year, which, with the help of some small etchings of scenes of town life and folly, replenished his purse, and gained him a moderate reputation. He now paid his addresses to Jane, daughter of Sir James Thornhill, to whom he was united in 1730, without the consent of her parents. The facility which Hogarth had gained in the use of the brush now induced him to attempt portrait-painting; but he soon abandoned this branch of art, and entered upon that original style on which his fame rests. He also made an unsuccessful attempt at historical painting.

The large demand for his engravings induced some printsellers to pirate them; but a bill was passed in 1735, by which a copyright of a print was granted for fourteen years after its publication. At the age of forty-eight, Hogarth was in easy circumstances, and rich enough to keep a carriage. The sale of his prints was his principal source of income: the price of his pictures kept pace neither with his fame nor with his expectations. In 1745 he sold by auction 19 pictures, including the Harlot's Progress and Rake's Progress, for 427*l.* 7*s.* In 1753 he published his 'Analysis of Beauty,' in which he attempted to prove that the foundation of beauty and grace consists in a flowing line.

For an account of Hogarth's contests with Wilkes, we must refer to his biographers. After his sixty-sixth year his health began to decline, and he died on the 26th October, 1764. He was buried in the churchyard at Chiswick, where his wife was also interred in 1789, in her 80th year. They had no children.

Hogarth is the first English painter who can be said to have acquired any name among foreigners: he is also one of the few who can be considered an original genius. His style may be characterised as the 'satirical;' the satire being sometimes humorous and comic, sometimes grave, bitter, and tragic. In the National Gallery there are seven of his pictures, consisting of his own portrait and the series of the Marriage à la Mode.

HOGG, JAMES, commonly called the Ettrick Shepherd, was born in the forest of Ettrick in Selkirkshire, in 1772. His forefathers had been shepherds for many generations. Hogg first began, he tells us, to be known as a maker of songs among the rustic population of his native district in 1796, at which time he was a shepherd in the service of Mr. Laidlaw of Blackhouse. The first of his productions that was printed was his song of 'Donald MacDonald,' which came out anonymously in 1801, and was a patriotic effusion on the subject of the threatened French invasion. Soon after, having gone to Edinburgh, to sell his master's sheep, he gratified his vanity by getting 1000 copies thrown off of a small collection of his verses, which however he was afterwards very sorry he had allowed to see the light. In the same year, 1801, while he was still with Mr. Laidlaw, Walter Scott, then engaged in collecting materials for his 'Minstrelsy of the Scottish Border,' became acquainted with him, and obtained from him some contributions to the third vol. of that work. In 1803 another collection of his poems was published at Edinburgh, under the title of the 'Mountain Bard,' the proceeds of which, with two prizes he got from the Highland Society for essays on the rearing and management of sheep, put him in possession of about 300*l.* With this money he took a farm, which soon turned out a ruinous concern. For some time he attempted in vain to get employment again as a shepherd, and at last, in February 1810, 'in utter desperation,' he says, 'I took my plaid about my shoulders, determined, since no better could be, to push my fortune as a literary man.' This was the commencement of a life of busy authorship, which may be said to have lasted till his death, although in 1814, after having married, he returned to the country, to live on a farm leased to him by the Duke of Buccleuch, which soon however, under his management, came to yield as little profit to the occupier as rent to the proprietor. Of Hogg's poetical works, by far the most remarkable is his 'Queen's Wake,' first published at Edinburgh in 1813. He wrote some tales in prose, and 'The Domestic Manners and Private Life of Sir W. Scott.' His death took place at his farm of Altrive, on the 21st of November, 1835.

HOGSHEAD, an ancient measure of liquids, which, not being mentioned in the Act 5 George IV., cannot now be considered as having any legal existence.

The hogshead of wine was 2 wine barrels, or 63 old wine gallons; the London hogshead of ale was 1½ ale barrel, or 48 ale gallons; the London hogshead of beer was 1½ beer barrel, or 54 beer

gallons; and the ale and beer hogshead for the rest of England was 1½ barrel, or 51 gallons. All Excise measurements being now made in gallons, the term hogshead remains in use only as the name of a large cask.

HOHENLOHE. [JAXT.]

HOHENZOLLERN, a sovereign principality in Germany, so called from a very ancient family of the same name, whose original seat was the ancient castle of Zollern, or Hohenzollern, which stands within two miles of Hechingen, on the road from Stuttgard to Schaffhausen. The family, which takes its origin from Count Thassilo, who died in 800, was divided towards the close of the 16th century into the two still existing branches of Hohenzollern-Sigmaringen and Hohenzollern-Hechingen. The territory is entirely inclosed between Würtemberg and Baden; its surface is mountainous, and the soil is in general stony. Corn more than enough for the consumption is raised; flax is extensively cultivated; horned cattle and sheep are numerous; and the forests abound with fine timber. There are iron mines in the northern part. The manufactures are unimportant. *Hohenzollern-Hechingen* which takes its distinctive name from the chief town *Hechingen*, on the Starzel, a feeder of the Necker (population 3400), occupies the more northern part, has an area of 116 square miles, and 20,143 inhabitants. *Hohenzollern-Sigmaringen* lies S. of the former, occupies a surface of 334 square miles, and had in 1846 a population of 45,431. It is drained by the Danube and some of its small feeders. *Sigmaringen*, the chief town, is a small place on the Danube, with 1600 inhabitants. From the younger or Hechingen branch, the royal family of Prussia is descended. In both principalities the government is hereditary, and the inhabitants are all Catholics.

HOLASTER, a genus of fossil *Echinidæ*, proposed by M. Agassiz to include species once ranked as *Spatangi*. *Spatangus subglobosus* (Leake), *Sp. planus* (Mantell), and *Sp. hemisphericus* (Phillips), are examples. The species occur almost exclusively in the chalk formation.

HOLBEACH. [LINCOLNSHIRE.]

HOLBEIN, HANS, is considered by the Germans to be the best of their early painters next to Albert Dürer, whom he however excelled in portraits. He was born in 1497, at Grünstadt. He was instructed in the art of painting by his father, whom he soon excelled. Accompanying his father to Basel, Holbein painted several portraits of Erasmus, who gave him a letter of recommendation to Sir Thomas More, and he came to England in 1526. He was subsequently taken into the service of Henry VIII., and painted a large number of pictures in this country, principally portraits, for which he was munificently rewarded. Several portraits by him are in the Hampton Court Gallery. He died at London, of the plague, in 1554.

HOLBERG, LUDWIG, BARON, was born at Bergen in Norway, in 1684. Having completed his studies at Copenhagen, he became a private tutor. He was eventually, in 1718, appointed Professor of Metaphysics, and in 1720 Professor of Eloquence at Copenhagen. He now astonished and delighted his countrymen by his Satires, and his comic poem of 'Peder Paars.' This production has acquired for its author the title of the Danish Butler.

The most formidable rival to the author of 'Peder Paars' is Holberg himself as a dramatist; for his comedies have rendered the poem only his secondary title to fame. His 'Metamorphoses,' in which he has reversed Ovid's system, transforming animals into men, instead of men into animals, is ingenious in idea and happy in execution. But that to which some have assigned the foremost place among his productions is 'Niels Klims' Subterraneous Journey,' first published in 1741, and written in Latin, but translated not only into Danish, but into almost every other European tongue. History, biography, philosophy, politics all employed his pen by turns. He died Jan. 27, 1754, in his 70th year. He was created a baron by Frederick V. of Denmark.

HOLCROFT, THOMAS, was born Dec. 10, 1745. His father kept a shoemaker's shop in Leicester Fields, London, and occasionally dealt in horses. When very young Holcroft became a stable-boy in racing-stables at Newmarket, and continued in the service of training-grooms till his seventeenth year, after which he lived a desultory life till twenty, when he married. About this time he had proceeded far enough in self-education to commit his performances to the columns of the 'Whitehall Evening Post;' but this whim soon gave way to others, and in a short time he found himself an actor. In 1780, he turned author, producing first a novel, then a comedy, and afterwards some poems, which were followed in their turn by a series of plays, and by translations of French works, of which those most remembered at present are—'Tales of the Castle,' and 'The Marriage of Figaro.' The play by which he is principally known is the 'Road to Ruin.' In 1789 he lost his son, and in 1790 his third wife. Four years afterwards he was implicated in the political trials relative to the Society for Constitutional Information. He lived much in Germany, and occasionally in Paris. He died March 23, 1809.

HOLCUS, a genus of grasses belonging to the tribe *Seslericeæ*. There are two British species of this genus. *H. lanatus* grows in meadows and pastures. *H. mollis* grows in thickets or open places on a light soil. The *H. cernuus* of Willdenow, and the *H. sorghum* of Linnæus, are now referred to the genus Sorghum.

HOLDERNESS. [YORKSHIRE.]

HOLINSHED, RAPHAEL, was born probably during the first half of the 16th century. Anthony à Wood says that he 'was educated at one of the universities, and was a minister of God's word;' it appears most probable that he was chaplain or steward to Thomas Burdet of Bromcote in Warwickshire. He died about 1580.

Holinshed is an important authority in English history. The first edition of his history is a very scarce black-letter in two vols. folio, adorned by numerous wood-cuts. The second edition omits these adornments, and has suffered also from the censorship of the times, which compelled the cancelling

of several sheets. It consists of the following items:—'Description of England,' by Harrison; of 'Ireland,' by Stanihurst; and of 'Scotland,' from the Latin of Hector Boethius, by W. H(arrison). 'History of England,' by R. H(olinshed); of 'Ireland till the Conquest,' from Giraldus Cambrensis, by J. Hooker (an uncle of the divine); 'till 1509,' by Holinshed; and 'till 1586,' by Hooker and Stanihurst; and of 'Scotland' till 1571, by Holinshed, and continued by others.

HOLKAR, MULHAR, RAO, was a Mahratta soldier, who, having been instrumental in extending the conquests of his nation, under the first Peshwa, towards the north of India, received a grant of land in Malwa about 1736. Ultimately one-half of that large province passed under his rule; and, before his death in 1766, he had rendered himself, in all but name, independent of his titular superior. He was succeeded by his grandson, a minor; but this boy soon died, and the inheritance passed to Tuckagee Holkar, who, dying in 1797, left four sons, whose patrimony was usurped for a time by Scindia, the most powerful of the Mahratta chiefs. In 1802 Jeswunt Rao Holkar, the third son, defeated Scindia, and re-established himself in Malwa. The Marquis Wellesley, then Governor-General, refused however to recognise his title, and in 1804 commenced a war against him, which was terminated at the end of 1805 by a peace which left to him the greater part of his dominions. The violence of his temper ultimately grew into madness; and the last three years of his life were passed in close confinement: he died in 1811. A wretched anarchy succeeded. After the final overthrow of the Mahratta power in 1818, Mulhar, the son of Jeswunt Holkar, was offered to retain a portion of his dominions, under the protection of the British.

HOLL, ELIAS, was born at Augsburg in 1573. His father was an architect. Elias was taken when young to Venice, and he there studied the Italian architecture, which style he adopted. Augsburg owes to Holl a great portion of its public buildings; but his masterpiece is the Rathaus, or town-hall, built 1615-20. He died in 1636, aged sixty-three.

HOLLAND, a large province in the kingdom of the Netherlands, situated between 51° 45′ and 53° 30′ N. lat., 3° 45′ and 5° 20′ E. long., is bounded N. and W. by the German Ocean, E. by the Zuider-zee and the provinces of Utrecht and Gelderland, and S. by Zeeland and North Brabant. The surface is flat, and in many parts below the level of the sea, against which it is protected by the sandy downs on the west coast, and by stupendous dykes built along the shores of the Zuider zee, the Haarlem-meer, and the banks of the principal rivers. The country is traversed by canals in all directions. A railroad passing from Rotterdam through the Hague, Leyden, Haarlem, Amsterdam, Utrecht, and thence to Rotterdam, incloses a very important part of the province; this road is now (Feb. 1849) open for traffic, except the portion between Utrecht and Rotterdam. The soil is marshy; it produces rich pastures, which support a fine breed of horses, cattle, and sheep. Gardens and orchards are carefully cultivated; some barley, oats, peas, beans, mustard, and other seeds are the chief crops in the northern part of the province; in the southern part more corn is produced. But pasturage prevails much more than arable cultivation, the produce of the dairy farms, butter, and cheese, constituting the chief wealth of the landholder. A remarkable feature of the country are the *polders*, a name given to lands that are below the level of the sea or adjacent river, and, having once formed a lake or marsh, have been surrounded by dykes, and cleared of water by means of pumps worked by windmills. The lands thus reclaimed are very fertile, and some of them of great extent, as the Beemster polders, near Edam, in the northern part of the province, which are 15 miles in circumference; the grain sown in them is sometimes destroyed by water, but rarely, for the mills are always at work, when there is any wind, lifting up the water to such a height as gives it a fall into the nearest river, canal, or sea. The effect produced on foreigners, who visit the polders for the first time, is one of surprise, not unmingled with alarm, at the apparent inversion of the natural order of things; luxuriant corn and rich grass-crops growing, and fat cattle and sheep pasturing, where water should lie; while the large sails of the canal barges flit past high above dykes, houses, and trees. The Haarlem-meer [HAARLEM] is now being drained by a powerful steam-engine for the purpose of converting its area into polders. Flowers are cultivated in the tract between Alkmaar and the Hague, but especially about Haarlem. Hemp, flax, and madder are grown. Wood, both for construction and for fuel, is scarce. The manufactures, which are chiefly carried on in the towns, are important; they are linen, paper, woollen cloths (for which Leyden is famous), silk, leather, tobacco, sugar, &c. The gin distilleries of Schiedam are very extensive, and have been long celebrated. Large quantities of fine lime are made from the shells gathered on the coast of the German Ocean. The fisheries on the coasts are important, and most industriously plied. The sleekness of the cows and horses, and the cleanliness of the dairies in Holland, are proverbial. The horses are all tender in the hoof. The province is divided into two governments: North Holland (Noord-Holland), and South Holland (Zuid-Holland).

North Holland extends north of the Haarlem-meer, and the mouth of the Old Rhine. It has an area of 955 square miles, and a population of 468,006. The Amstel and the Vecht flow through the south-east of the government, the Zaan through its centre. The Helder Canal, by which the largest merchant-vessels reach Amsterdam direct from the German Ocean without encountering the difficult navigation of the Zuider zee, runs from Amsterdam to the Mars-diep or strait that separates the Texel from the main land. It is 120 feet wide, 25 deep, and above 50 miles in length. North Holland is sometimes called West Friesland. The chief towns are ALKMAAR; AMSTERDAM; HAARLEM.

Amstelveen is a well-built town with 5600 in-

habitants, situated between the Amstel and the Haarlem-meer, and 6 miles S. by W. from Amsterdam.

Broek, a village of 800 inhabitants, composed chiefly of retired merchants and their families, is the much bepraised model of the precise neatness and punctilious cleanliness of the Dutch. The narrow lanes that intersect it are paved with bricks, strewed with sand or shell, and always clean. No horse or vehicle of any kind is allowed to pass along them. The houses are of wood, painted white and green, and roofed with glazed tiles of different colours. The front doors and windows are never opened except on great occasions, such as a funeral, a wedding, or a christening. The interiors of the houses correspond to the exterior in order, cleanliness, and tidiness; but have more the appearance of large baby-houses than of the dwellings of men. The cow-houses here are curiosities in their way; they are washed out, walls and floors, several times a day; the cows' tails are fastened to hooks in the ceiling, lest they might by accident besmear their sides with them. Broek is 6 miles N. by E. from Amsterdam; it is famous for its sweet milk cheeses.

Edam, a town of 3500 inhabitants, stands S.E. of the Beemster polders, and near the Zuider-zee, in which it has a good harbour. The export trade in sweet milk cheese from this port is important; the chief industrial products are salt and fish oil.

Enkhuizen, situated on a peninsula in the Zuider-zee, 28 miles N. by E. from Amsterdam, is a well-built fortified town with 8000 inhabitants. It was formerly the centre of the great deep-sea herring fishery; 400 large vessels used annually to sail from its harbour, which is now nearly choked up with sand. The town possesses 9 churches, an hospital, salt-refineries, and a cannon foundry; the town-house with its lofty tower is the most imposing structure. Its commerce is composed chiefly of butter, cheese, timber, and herrings; ship-building is carried on. This place has declined greatly from its former commercial and industrial activity.

Helder, a small fortified town of 2800 inhabitants, stands on the Mars-diep, at the extremity of the spit of land in which N. Holland terminates, opposite the Texel. About a mile E. of Helder is the fine harbour of *Nieuwe-Diep*, formed by piers and jetties, and admitting the largest merchantmen and men-of-war close to the quays, where they are sheltered from every wind; by this harbour the great Helder Canal enters the North Sea. The great *Helder-Dyke*, which protects the extremity of N. Holland from the fury of the storms to which it it exposed, is one of the most astonishing monuments of Dutch industry, perseverance, and skill. It is nearly 6 miles in length, 40 feet broad on the summit, along which there is a good road; it presents to the sea a slant side of 200 feet, inclined at an angle of 40°, the whole constructed of granite blocks brought from Norway.

Hilversum, a small town 15 miles S.E. from Amsterdam, has 3500 inhabitants, who manufacture carpets and calicoes.

Hoorn, a city and seaport, on the Zuider-zee, eastward of Alkmaar, with which it is connecte by a canal, is well built, surrounded by old ra parts, and has 10,000 inhabitants. The gre fleet of Admiral De Ruyter was built in Hoor but the importance of the place has vanished; th present trade consists chiefly in exports of butte cheese, provisions, and fish. The manufactures woollen stuffs, carpets, &c.; the ship-building an the herring fishery, though still important, are in significant compared to their former magnitude Schouten, who first doubled Cape Hoorn or Horn in 1616, and Tasman, the discoverer of Van Die men's Land and New Zealand, were natives Hoorn.

Medenblik, N.W. of Enkhuizen, on the Zuider zee, had formerly an extensive foreign commerce it has now scarcely any foreign trade, and it population is only 2400. It contains a roya naval academy, and its chief commerce is in tim ber and cheese. The harbour is large and good.

Naarden, a fortress, on the south shore of th Zuider-zee, 12 miles E. from Amsterdam, ha 2000 inhabitants, who manufacture silk an velvet. It forms the key of all the water com munication of Holland, and is important for th defence of Amsterdam, with which it is connecte by a fine canal.

Zaandam (commonly corrupted into *Saardam*) a town of 12,000 inhabitants, on the north shor of the Y, and at the mouth of the Zaan, which divides it into Oost-Zaandam and West-Zaandam The houses are mostly constructed of wood, an painted; each of them is surrounded by a smal canal and completely insulated. From a distance the town has a most singular appearance; it seem to consist of a line of windmills, some of which ar of gigantic size and have houses attached to them extending along the Zaan, and forming a stree nearly 5 miles in length. The number of thes mills is variously stated, but it seems to amoun to about 700; they are applied to the various pur poses of grinding corn, draining the land, sawin timber, making paper, grinding tobacco into snu crushing rapeseed to express the oil, grinding c lours for the painter, grinding stones into sand f the floors of the Dutch housewife, and grindin the volcanic substance called trass into dust i order to form a cement, which hardens und water and is much used in Holland. The tow is often visited for the purpose of seeing the h in which Peter the Great worked and slept duri his short stay here to learn ship-building in 1696

To North Holland belong the islands, *Mark* and *Urk*, in the Zuider-zee; and *Wieringen* (miles in circumference; population 1500); *Vl land* (which consists chiefly of sand hills, and h 800 inhabitants); *Ter-schelling* (14 miles long 2½ broad; population 2000, residing in four v lages on the south coast, and engaged in fishin and *Texel*, at the entrance of the Zuider-zee.

The *Texel* is separated from the north of t province by the Mars-diep; it is 12 miles lo and 6 broad, and has 5000 inhabitants, mos shepherds and fishermen. The island is fam for its breed of fine-woolled sheep. The north part of the Texel was formerly a distinct isla but is joined to the southern part by a sand ba

since 1629; it is called *Eierland* or Egg-land, from the great number of gulls' eggs found on it.

South Holland has an area of 1170 square miles, and had on Jan. 1, 1847, 566,257 inhabitants. It lies S. of the Haarlem-meer, and is traversed by the Old Rhine, the Yssel, the Lech, and by the large branches of the Maas, which form the islands of Voorne, Overflackkee, Goeree, Putten, Beveland, Ysselmonde, Dordrecht, and Rozenburg W. of Ysselmonde. The chief towns are DELFT; DORT; HAGUE; LEYDEN; ROTTERDAM.

Briel or *Brielle*, a well-built and fortified town, situated on the Maas, and on the northern shore of the island of Voorne, has a large and commodious harbour, and 4200 inhabitants, many of whom are pilots and fishermen. It is the birthplace of Admirals Van Tromp and De Witt.

Delfshaven, the port of Delft, stands on the right bank of the Maas, at the embouchure of the canal that leads to Delft and the Hague; it is a place of some trade, and has ship-building yards, and a population of 3000.

Gorkum, a fortified town, on the right bank of the Maas, and traversed by the Linge, a feeder of the Maas, is well built, and has a good trade in corn, fish, agricultural produce, &c. The population numbers 6800; many of them are engaged in the salmon and herring fisheries. The chief manufacture is tobacco pipes.

Gouda, N.E. of Rotterdam, on the right bank of the Yssel, at the point where it is joined by the Gouw, is a large fortified town, with a population of 13,000. The town has 5 churches, an hospital, an orphan house, tobacco-pipe factories that give employment to 6000 men, brickworks, the clay for the supply of which is taken from the bed of the Yssel, rope-walks, gin-distilleries, and breweries. The most important buildings are the town-house and the church, dedicated to St. John, which is famous for its splendid painted windows; both these buildings stand in the great square, in which markets are held. Gouda numbers also among its industrial products woollen cloth and sailcloth; it is famous as a cheese market.

Helvoetsluis, a small town of 2000 inhabitants, important for its fortifications, its harbour, and large naval dockyards, stands in the isle of Voorne, on the right bank of the Haringvliet branch of the Maas, which separates Voorne from Overflackee. The Prince of Orange sailed from this port for England, Nov. 11, 1688.

Katwyk, N. of the Hague, is a small place famous for the canal and the stupendous dykes and flood-gates executed by the engineer Conrad, for Louis Bonaparte in 1809, to assist the Rhine in its struggles to reach the sea.

Maaslandsluis or *Maassluis*, stands W. of Rotterdam, at the extremity of the canal that enters the Maas opposite the isle of Rozenburg, and has 5000 inhabitants, many of whom are engaged in the herring and whale fisheries. Sailcloth, ropes, leather, and fish oil are the chief industrial products.

Ryswyk, a small village near the Hague, deserves mention as the place where the famous treaty of peace was signed in 1697 between England, France, Holland, Germany, and Spain. The site of the house in which this treaty was concluded is now marked by an obelisk.

Scheveningen, on the coast, N.W. of the Hague, is the rendezvous of the gay world of the Hague in the bathing season; it is joined to the Hague by a straight and magnificent avenue of oaks and limes. It has 3000 inhabitants, a splendid bathing establishment, which includes also the accommodations of an hotel. The population is chiefly engaged in fishing for the supply of the Hague market.

Schiedam, a well-built town, with a good harbour, near the outflow of the Schie into the Maas, has 5 churches, an exchange, glassworks, rope-walks, and white-lead works. The town is surrounded by windmills, and contains above 200 distilleries for the manufacture of gin, for which it is universally celebrated. It has a large trade in pigs, 30,000 of which are said to be annually fattened on the grains from the distilleries. The inhabitants, many of whom are engaged in the fisheries, number 10,600.

Schoonhoven, famous for its salmon fishery, stands in a marshy but well-cultivated district, E. of Rotterdam, on the right bank of the Leck, which here forms a good harbour, and receives the Vlist. The population is 2500.

Vlaardingen, the head-quarters of the Dutch herring fishery, for which it fits out annually from 80 to 100 vessels, stands on the right bank of the Maas. It is a pretty and a well-built town, with a population of 6500.

HOLLAND, NEW. [AUSTRALIA.]

HOLLAND, PHILEMON, was born at Chelmsford in 1551, and educated there and at Trinity College, Cambridge, of which he became a Fellow. Afterwards he was elected master of the Coventry free grammar-school. He is, to the best of our knowledge, the first English translator of Livy, Suetonius, and Plutarch's 'Morals,' and the only English translator of Pliny's 'Natural History,' and Ammianus Marcellinus. He also translated Xenophon's 'Cyropædia,' and Camden's 'Britannia.' In addition to all this, he found time to study and practise physic, and reached the age of 85, with unclouded faculties.

HOLLAND, SIR NATHANIEL, was the third son of Dance, the architect of the Mansion House, and the younger brother of George Dance, R.A., the architect of Newgate.

Nathaniel Dance was the pupil of Hayman. He was one of the original members of the Royal Academy, and he contributed many works to the Academy exhibitions. He changed his name to Holland upon his acquisition of a baronetcy in 1800, having previously married Mrs. Dummer, who was possessed of entailed estates to the value of 18,000*l.* per annum. Upon his acquisition of his title, Sir Nathaniel Holland appears to have resigned his academical diploma, for from that time he exhibited as an honorary exhibitor. He represented for some time the borough of East Grinstead: he resided at Cranbury House, near Winchester, and he died suddenly in that city, Oct. 15, 1811, aged about 68. All his best works are chiefly in private collections. Orpheus,

and Garrick as Richard III., are two of his best works.

HOLLAND, HENRY, held a high rank among the architects of his own time, and was greatly patronised by George IV. when Prince of Wales. But we have no information as to his personal history. His finest work was the portico of Carlton House. The Pavilion at Brighton was built by him, but was transformed into its present shape by Nash. Drury-Lane Theatre, which was burnt down in February 1809, was erected by Holland, and he was also the architect of the India House. He died at his house in Hans Place, June 17, 1806, aged about 60.

HOLLAND, HENRY RICHARD VASSAL FOX, LORD, was the only son of Stephen, second Lord Holland. His mother was Mary, daughter of John Fitzpatrick, first Earl of Upper Ossory. He was born at Winterslow House, Wilts, Nov. 21, 1773. He succeeded to the peerage when he was little more than a twelvemonth old. He was educated at Eton, and at Christ's Church, Oxford, where he took the honorary degree of M.A., in right of his rank, in June 1792.

It was in the course of a continental tour, that at Florence, in the beginning of the year 1795, he first met Lady Webster, the wife of Sir Godfrey Webster, with whom he returned to England in June 1796, and whom he married the next year, after she had been divorced from her first husband, who obtained 6000*l.* damages in an action against Lord Holland. After his marriage with Lady Webster, Lord Holland assumed, by sign-manual, her family name of Vassal, which however has been laid aside by his children.

He now took his place in the House of Lords. His first speech was made on the 9th of January, 1798. From this date Lord Holland took a frequent part in the debates for the next four years, being all this time one of the steadiest opponents of the administration, and seconding in the Upper House the principal efforts of his uncle Charles James Fox in the Commons.

On Aug. 28, 1806, Lord Holland and Lord Auckland were appointed joint-commissioners for arranging the several matters in discussion between this country and the United States, with Mr. Munro and Mr. Pinckney, the United States' commissioners; and on the 27th of the same month he was sworn of the privy council. An arrangement of the differences with America was effected after a long negotiation, but Mr. Jefferson refused his ratification, and it came to nothing. On Oct. 15, after the death of Mr. Fox, Lord Holland was appointed lord privy seal; and he held that office for the six months longer that the Grenville ministry lasted.

In 1806, Lord Holland published 'Some Account of the Life and Writings of Lope Felix de Vega Carpio,' and followed it up next year with 'Three Comedies from the Spanish;' and in 1808 he edited and introduced by a preface Mr. Fox's fragment entitled 'A History of the early part of the Reign of James the Second.'

On the accession of the Whigs to power in November 1830, he became once more a cabinet minister as Chancellor of the Duchy of Lancaster; and this office he held (with the exception of the ministerial interregnum of a fortnight in May 1832, and Sir Robert Peel's four months' tenure of power from December 1834 to April 1835) till his death at Holland House on the 22nd of October, 1840. He was succeeded by his son, the present Lord Holland.

HOLLAR, WENCESLAUS, was born at Prague, in Bohemia, in 1607. He was first intended for the profession of the law, but abandoned it for art. He was only eighteen when his first specimens appeared. These were a print of the 'Ecce Homo,' and another of the Virgin, with a Virgin and a Christ after Albert Dürer, with Greek verses at the bottom of the plate, executed in 1625. He removed from Prague in 1627. His views along the Rhine, the Danube, and the Neckar gained him his greatest reputation. In 1636, Howard, earl of Arundel, met with Hollar, when proceeding on his embassy to Ferdinand II., and took him into his retinue. Hollar attended him to the emperor's court, and made several drawings and prints of the places through which they travelled. Lord Arundel brought Hollar to England, where he painted portraits of the royal family, and executed other subjects, of which his view of Greenwich, dated 1637, was one of the first. On the breaking out of the civil war, he experienced some vicissitudes of fortune, but eventually joined Lord Arundel at Antwerp, where he remained for several years. In 1652 he returned to England, and worked incessantly till the time of his death. The plates by him in the first and second volumes of the old edition of Dugdale's 'Monasticon,' in Dugdale's 'History of St. Paul's,' and in his 'Survey of Warwickshire,' sufficiently prove his industry. He died in London, March 28, 1677. His works, according to Vertue's catalogue of them, amount to nearly 2400 prints.

HOLLY. [ILEX.]

HOLLYHOCK. [ALTHÆA.]

HOLO'STEUM, a genus of plants belonging to the natural order *Caryophylleæ*, and the sub-order *Alsineæ*. The species of this genus are herbs with nothing to recommend them for use or cultivation. One species, *H. umbellatum*, is British. It is not a common plant, but has been found on old walls and dry places at Norwich, Bury St. Edmund's, Eye, and Yarmouth.

HOLOTHU'RIA (*Holothuria Family*), a ra of marine animals whose particular organisation not yet fully elaborated. Cuvier places the Holothuria under his *Echinodermes Pédicell* and M. De Blainville assigns them a situati within the pale of his *Echinodermata*.

For a sketch of the anatomy of these singu beings see Cuvier ('Règne Anim.,' vol. iii. p. 23 The Holothuria are divided into many gene very indefinitely determined.

According to M. Delle Chiaje, certain species Holothuria are eaten by the poor inhabitants the Neapolitan coast; but the Chinese re these Sea Cucumbers, as they are called fr their shape, as delicacies. Whole fleets of Mal proas visit the south coast of Australia, the no coast of Ceylon, and the west coast of New Gui

for the purpose of procuring and salting these slug-like animals. The cargo is generally carried to Timor or Macassar, and sold to the Chinese, who meet the vessels on their return from their fishing. These animals are known under the name of Tripang and Biche de Mer. In the market of Macassar, the great staple of this fishery, not less than thirty varieties are distinguished, varying greatly in price, according to the estimation in which they are held. The ordinary size of the slug is about a span in length and two or three inches in girth, but some specimens reach nearly two feet in length and seven or eight inches in circumference.

HOLSTEIN. [SCHLESWIG and HOLSTEIN.]

HOLSTENIUS, the Latinized name of L. HOLSTE, born at Hamburg in 1595, became one of the first scholars of his time. At Paris he embraced the Roman Catholic religion. He accompanied Cardinal Barberini, the nephew of Urban VIII., to Rome in 1527. From that time he lived in the cardinal's house, was made canon of St. Peter's, and lastly librarian of the Vatican. He was sent on several missions to Germany, among others to Innspruck, to receive the abjuration of Queen Christina of Sweden. Holstenius died at Rome in February, 1661. He had collected a vast quantity of scarce books and MSS., and he left many works of his own in an unfinished state. His published works are numerous, and some of them are valuable.

HOLSWORTHY. [DEVONSHIRE.]

HOLT. [DENBIGHSHIRE.]

HOLT, SIR JOHN, lord-chief-justice of the King's Bench, was the eldest son of Sir Thomas Holt, Knt., a bencher of Gray's Inn, and a gentleman of property in Oxfordshire. Sir John was born at Thame in Oxfordshire, Dec. 30, 1642, and was in his sixteenth year entered as a gentleman commoner at Oriel College, Oxford. His college life appears to have been unusually wild and licentious. In 1652, before he was ten years old, he had been entered upon the books of the Society of Gray's Inn, and on the 27th February, 1663, was called to the bar, and rose rapidly into notice as a first-rate lawyer and successful advocate. He was employed in most of the state trials which the troubled times in which he lived produced, and was generally counsel on behalf of the accused. His opposition to the measures of the court brought upon him the vengeance of James II., who procured his removal from the recordership of London. Shortly after the accession of William III. (April 1689) Sir John Holt was made lord-chief-justice of the King's Bench, in which situation he continued during the remainder of his life, although the chancellorship was offered to him on the removal of Lord Somers in 1700. Sir John Holt died in March, 1709-10, leaving behind him a high reputation for learning, honour, and integrity.

HOLYHEAD. [MENAI STRAIT.]

HOLY ISLAND. [DURHAM.]

HOLY ORDERS. [ORDINATION.]

HOLYWELL. [FLINTSHIRE.]

HOLZER, JOHANN, a fresco painter, was born at Burgeis, in the Tyrol, in 1709. His father was miller to the Benedictine convent of Marienberg, and Holzer was first instructed by N. Auer, at Meran in the Tyrol. He made here such progress, that at the age of 18 he was invited by the painter J. A. Merz, to Straubing in Bavaria, to assist him in some frescoes in the convent church of Oberalteich. From Straubing Holzer went to Augsburg, where he lived six years in the house of the painter J. G. Bergmiller. Holzer painted many excellent frescoes upon the exteriors of houses in Augsburg, but few, if any, now remain; there is however a collection of twenty-eight prints after them by J. E. Nilson, entitled 'Picturæ a Fresco in Ædibus Augustæ Vind., a J. Holzer,' &c. Holzer's greatest works are the frescoes of the convent church of Schwarzach near Würzburg. They are now in a dilapidated condition. Holzer died of a fever at Clemenswerth, in July, 1740, at the age of 30.

HOLZMINDEN. [BRUNSWICK.]

HOMAGE, an incident of tenure which is now abolished by 12 Car. II. c. 24. The word is derived from homo, because, when the tenant did his service to the Lord, he said 'I become your man,' &c. (Litt. s. 85.) The copyholders, or tenants who attend to do their duty in a court baron, are called *the homage*.

HOMALIA'CEÆ, a small natural order of shrubby exogenous plants with polypetalous flowers. The species chiefly inhabit tropical countries; they have small starry flowers, and are of no known utility. Brown considers them nearly related to *Passifloraceæ*.

HO'MARUS. M. Milne Edwards separates the true marine lobsters from the fluviatile crawfishes under the title of *Homarus*, reserving to the latter the title of *Astacus*. He regards the genera *Astacus*, *Homarus*, and *Nephrops* as constituting the family of the Astacians. [ASTACUS.] Fossil impressions of Astacians have been described by various writers.

HOMBURG. [HESSE-HOMBURG.]

HOME, HENRY, LORD KAMES, was born at Kames, in the county of Berwick, 1696. He was originally bound to a writer of the signet, but by diligent study he qualified himself for the higher practice of an advocate. His first work, entitled 'Remarkable Decisions in the Court of Sessions,' which appeared in 1728, excited considerable attention. The reputation of Mr. Home was still further established by the publication of his 'Essays on several Subjects in Law.' In 1741 he published, in 2 vols. fol., 'Decisions of the Court of Sessions,' and in 1747 appeared his 'Essays on several Subjects concerning British Antiquities.' In his 'Essays on the Principles of Morality and Natural Religion,' he gave offence in some quarters. In 1752 Mr. Home was appointed a judge of the court of session, and took his seat by the title of Lord Kames. At the same time he was nominated a trustee for the encouragement of manufactures, fisheries, and arts, and also commissioner for the management of forfeited estates. But he found leisure to compose two important works, in which he attempted to apply to the science of jurisprudence the principles of philosophy, 'Historical Law Tracts,' and 'The Prin-

ciples of Equity.' In 1761 he published an 'Introduction to the Art of Thinking,' and the year following, 'Elements of Criticism,' 3 vols. 8vo. In 1763 he was appointed one of the lords commissioners of justiciary; in 1774 he published 'Sketches of the History of Man,' 2 vols. 4to. In 1776 appeared 'The Gentleman Farmer, or an Attempt to improve Agriculture by subjecting it to the test of Rational Principles.' He died Dec. 27, 1783.

Lord Kames's reputation as an author rests at present principally upon his 'Elements of Criticism.'

HOME, or HUME, JOHN, was born in Scotland about the year 1722, and is supposed to have been a relation of David Hume. He was bred to the ministry of the kirk, and subsequently nominated to the parish of Athelstaneford, where he produced his tragedy of 'Douglas,' which was acted at Edinburgh with the most unbounded applause. Perhaps there never was a dramatic composition more harmless; but the circumstance of its being a drama was enough to draw down the anger of the rigid elders of the kirk. Not only did they expel * him from the ministry, but even denounced those of his friends who might visit him, or go to see the performance of his piece. Home retired to England, where he received the protection of the Earl of Bute, and obtained a pension. Four other tragedies, 'Agis,' 'Aquileia,' 'The Fatal Discovery,' and 'Alonso,' followed 'Douglas,' but they did not equal it, and have been long since forgotten. Home died in 1808.

HOMER (in Greek, Homéros), the supposed author of the earliest Greek heroic poems extant, and of some hymns in praise of different gods. Opinions the most various have been held regarding his birthplace, his age, his station, and the circumstances of his life. The author or authors of the 'Iliad' appear from the work to have been accurately acquainted with the geography of Greece and the northern part of the Archipelago; and it has been inferred that Homer was a wandering minstrel. The existence of such wandering minstrels seems to be shown by the Hymn to Apollo, quoted by Thucydides; as the notices of Phemius and Demódocus, in the Homeric poems, prove the existence of bards attached to particular courts.

The poems attributed to Homer are the Iliad and the Odyssey, to which some have added the Homeric Hymns. Of these poems, the Iliad stands first, as the oldest and at the same time the completest specimen of a national heroic poem.

Its subject is the revenge which Achilles took on Agamemnon for depriving him of his mistress Briseis, during the siege of Troy; and the consequent evils which befell the Greeks. It is divided into twenty-four rhapsodies or books, which detail the history of the besieging force during the period of Achilles' anger, and end with the death of Hector (who is slain by Achilles in retaliation for Hector's having killed Patroclus), and the solemn burial of the Trojan warrior. Heroic poetry, as a simple form of art, does not imply the development of a plot, but rather the extraction of a certain portion from the poetical annals of a nation, beginning and ending just where the subject may seem to suggest, but not necessarily ending with a regular disengagement of a plot regularly worked up and studiously combined from the beginning of the poem. Whether what we now possess be the exact poem which thus forms the beginning of all Greek literature, is scarcely doubtful. The lapse of so many ages can hardly have failed to have introduced some passages, and to have altered and removed others.

The Odyssey can hardly be called a national epic. It is much nearer the romance of chivalry than any other ancient work now in existence. It contains the account of those adventures which Ulysses (Odysseus) encountered on his way home from Troy, and in its present state consists of twenty-four books, which division is said to be owing to the grammarians in the time of the Ptolemies. There is little doubt that much has been interpolated in the account of Ulysses's visit to the shades, and Aristophanes and Aristarchus the grammarians considered the latter part of the 23rd and all the 24th book spurious. A characteristic of the Odyssey to which we have just alluded, is its romantic look, using romantic as opposed to classical. There is something quite northern in the adventures of Ulysses; they might have happened to a knight of Arthur's court, or perhaps still better to Beowulf. The Sirens would be singing maidens, who decoy travellers by their strains; the nymph Calypso would find an antitype in some enchantress. Ulysses slays the suitors much in the way of William of Cloudesley in the old ballad.

The difference in the character of the Iliad and Odyssey might lead us to the conclusion that these poems are not the product of the same mind. Other differences however of less importance have been pointed out by the critics. How far either poem can claim a single author is a still more difficult question. There is an historical fact which has been adduced in support of one side of this question, namely, the existence of a race of men called Rhapsodists, or Homeridæ, who imitated Homer, enlarged upon him, and interpolated his poems with verses of their own (Hermann, 'Preface to Homer's Hymns,' p. 7); treating him very much as the Bible was treated by one school of the early Mystery-mongers. Now those who deny the unity of the Iliad assert that these Rhapsodists manufactured it among themselves, until it gradually assumed that form in which Pisistratus finally established it, and in which we now have it. Whatever truth there may be in this opinion or any other as to the Homeric poems, we must admit that many lines and even whole passages may be interpolations. The Hymns, Epigrams, and the 'Battle of the Frogs and Mice' make up the sum of the Homeric poems, genuine and spurious.

The earliest mention made of Homer is by Pindar. Herodotus and Thucydides quote and refer to him; and by Plato he is constantly either hinted at or transcribed. The subject of Homer

* Some accounts say that he foresaw his expulsion, and avoided it by retiring.

is discussed in Thirlwall's 'History of Greece,' Grote's 'History of Greece,' and in the 'History of Greek Literature,' in the 'Library of Useful Knowledge;' in the article 'Homer,' in the 'Penny Cyclopædia,' and in the 'Dictionary of Greek and Roman Biography and Mythology,' edited by Dr. W. Smith.

The principal modern editions of Homer are, those by Clarke and Payne Knight, in this country (the latter having the digammas inserted in what the editor supposes to be their proper places), and abroad, Heyne, Hermann, and Nitzsch, for the Iliad, Hymns, and Odyssey respectively. The last edition of the text of the Iliad and Odyssey, is by Bekker, Berlin, 1843, 8vo. Of translations we have Hobbes, Chapman, Pope, Cowper, and Sotheby; but of these Pope's, the best known, is rather an imitation, not at all in the style of the original, than a translation. Perhaps, on the whole, Chapman's is the best. The German translation by Voss is wonderful as regards accuracy. It is in hexameters, and preserves every sentence, and nearly every word.

HOMICIDE. [MURDER.]

HOMILY (*ὁμιλία*), in ecclesiastical writers, is a familiar discourse on a religious subject. In the earliest ages of the church the words *sermon* (*λόγος*) and homily appear to have been used indifferently.

All the homilies of the Greek and Latin fathers were composed by bishops, for before the fifth century none but bishops were allowed to preach. In modern use the term 'homily' is applied to a discourse read out of a book, and not composed by the preacher. At the period of the Reformation in England two books of homilies were published by authority, in order to insure uniformity of doctrine in the Church of England, and to supply the defects of some of the clergy. A handsome edition of the homilies has been published by the Prayer-Book and Homily Society (London, 1833).

HOMŒO'PATHY (a Greek word, *ὁμοιοπάθεια*, literally 'similar or like state of feeling'), a mode of treating diseases, founded on peculiar doctrines, which were first proposed in 1796 by Samuel Hahnemann, a German physician. [HAHNEMANN.] The homœopathic method consists in the administration of a medicine which is capable of exciting in healthy persons symptoms closely similar to those of the disease which it is desired to cure.

This system of medicine is supposed to stand in direct contradistinction to that founded upon the principle of treating diseases by their opposites, 'contraria contrariis curantur,' which has been assumed to be more or less a guiding law since the time of Galen. The arguments adduced in support of the truth of the homœopathic law seem principally drawn from the three following sources:—

1st. Popular experience, it is said, has proved that the safest manner of restoring the circulation of a frozen limb is to rub it with snow (similia similibus). Warm applications, according to the evidences of the same experience, would cause the destruction of the part affected (contraria contrariis).

Again, severe burns are most quickly cured by the use of heated spirits of wine or oil of turpentine, which excite a very similar sensation, although in a greatly modified degree (similia similibus). Cold applications, although they give temporary relief, are, as is well known, generally followed by increased inflammation and severe after-suffering (contraria contrariis).

The homœopathists also insist that the acknowledged efficacy of Jenner's great discovery is a powerful argument of the truth of the homœopathic law, since by producing a similar disease an almost perfect immunity from attacks of the small-pox is obtained.

2ndly. The homœopathists endeavour to show by a number of observations collected from the works of different medical authors, that many drugs recorded by them as curative in different forms of disease, were observed by others to produce effects closely resembling the symptoms of those very forms of disease, or that they acted upon the principle similia similibus.

3rdly. Hahnemann, it is said, was first struck with the close analogy between the symptoms produced by Peruvian bark and those of the forms of disease for which it was considered a specific, and, having obtained similar results from other medicines tried upon his own person, was led to the discovery of the homœopathic law; and he, believing that the mode of operation of all remedial agents was in perfect harmony with this principle, by repeated experiments upon himself and some medical friends, converted to his opinions, first determined their direct action and then employed them in disease. It should be stated that, although these experiments have been often repeated, no uniform results have taken place.

The extremely minute quantities of which the remedies are administered seem to form a marked difference between the homœopathic and all other schools of medicine. The homœopathists however assert that this is merely a point of practice to be determined by the physician at the bedside of his patient, and that, in the application of the homœopathic principle to the treatment of disease, it was soon found that remedial agents given in the doses usually employed acted too energetically upon a frame already predisposed to their influence by the affinity existing between their medicinal effects and the morbid signs of the disease; and hence a gradual diminution was made in the quantity of the medicine exhibited, in order to approximate to that amount which might exert its full curative power without aggravating the sufferings of the patient by an excess of medicinal action. The result has been, the general adoption among homœopathists of the minute dose at present in use, which perhaps more than any other cause, from its discrepancy with generally received opinions, has prevented any impartial investigation into the principles of the new system by the profession at large. The doses recommended by Hahnemann are sometimes so small that, although cures have been performed, it appears most reasonable to regard these merely as new proofs of how much may be done by the strict regulation of diet, by the powers of nature, and by

the wonderful influence of the imagination upon the body. When patients are firmly convinced that they shall be cured, the cessation of nervous pains, particular those of an hysterical nature, may with more justice be ascribed to the influence of the mind than to the power of infinitesimal doses of medicine.

HOMOGE'NEOUS, HETEROGE'NEOUS, are terms applied in mathematical language to expressions which have or have not the same number of factors of a given sort in each term. Thus, with respect to x and y, $ax^2 + bxy + cx^2$ is homogeneous, but $ax^2 + by$ is heterogeneous.

HO'MOLA, *Homola Tribe.* The Homolians, according to the system of M. Milne Edwards, constitute a group of the anomurous crustaceans, including the genera *Homola*, *Lithodes*, and *Lomis*; genera which he regards as closely related to each other, although previous naturalists had placed them widely asunder. Of the habits and manners of these small crustaceans nothing is known.

HOMO'LOGOUS, a term applied in Euclid to those magnitudes which, being of the same kind, occupy different places in a proportion, one being an extreme, and the other a mean.

HOMOLONO'TUS, the name of a group of Trilobites, in which the tripartite character of the dorsal crust is almost lost; for which reason Mr. Miller called it Monolobite. *Homolonotus Knightii* occurs in the Upper Silurian rocks of England, and a similar species at the Cape of Good Hope.

HOMO'PTERA, one of the sections into which the class *Insecta* is divided. According to Leach, Stephens, and some other authors, the section *Homoptera* is regarded as an order; but in Latreille's arrangement it forms the second of the two great sections into which the order *Hemiptera* is divided. The insects of this group are thus characterised by Latreille:—Rostrum arising from the lowest part of the head near the chest; the elytra, almost always tectiform, are of the same consistence throughout, semi-membranous, and sometimes resembling the wings; the three segments of the thorax are blended, and the first is often shorter than the following.

In the typical *Homoptera* the head is large, broader than long; the eyes are large, and there are ocelli, or simple eyes, between them; the antennæ are minute, composed of but few joints, and terminated by a seta; the rostrum is a slender-jointed process, which, like that of the Hemiptera, lies close to the chest; the legs are of moderate size; the hinder tibiæ are usually spined; the body is convex above and flattish beneath; the wings are semi-membranous, the anterior pair often opaque, sometimes transparent, and always of a uniform texture throughout. The larvæ are active, and resemble the perfect insect, excepting that they possess no wings; the pupæ are also active, but possess rudimentary wings.

These insects feed upon vegetable juices. The females are furnished with an ovipositor, composed of three denticulated blade-like processes, which are lodged in a groove in the abdomen. By means of this ovipositor they pierce holes in vegetables, in which they deposit their eggs. Many homopterous insects possess the power of leaping by means of their posterior pair of legs.

The section or order *Homoptera* may be divided into the following families, most of which are analogous to Linnæan genera, or nearly so.

1, *Cicadiidæ* (Leach); 2, *Fulgoridæ* (Stephens); 3, *Cercopidæ* (Leach); 4, *Psyllidæ* (Stephens); 5, *Thripidæ* (Stephens); 6, *Aphidæ* (Leach); 7, *Coccidæ* (Leach). The first two families constitute the section *Cicadariæ* of the 'Règne Animal.' [FULGORA.] The other references are CICADELLA, APHIS, GALLINSECTA. (Note.—In the article FULGORA, for *Hemiptera* read *Homoptera*, and in the article CICADELLA, for *Hymenoptera* read *Homoptera*.)

HONDEKOETER, the name of a celebrated family of Dutch painters, of whom the founder, Egidius Hondekoeter, born at Utrecht in 1583, was the son of a marquis of Westerloo, a wealthy landowner in Brazil. He painted chiefly landscapes, and he died at Amsterdam. His son *Gijsbert*, born in 1613, painted landscapes in the manner of his father. He died at Utrecht in 1653. *Melchior Hondekoeter*, son of Gijsbert, born in 1636, was the most distinguished of the family. He painted poultry with admirable skill. His pictures are held in high estimation, and fetch great prices. He died in 1695.

HONDURAS. [BALIZE; CENTRAL AMERICA.]

HONE, WILLIAM, was born in 1779, at Bath, where his father is stated to have been an occasional preacher among the dissenters. After being engaged for some years as an attorney's clerk at Chatham and in London, William quitted the law, and, having married, set up in July 1800 as a bookseller, in Lambeth, and afterwards in three or four other places in London, in all of which he was unsuccessful. In 1811 he took an humble lodging in the Old Bailey, and endeavoured for a time to support his seven children by contributing to periodical publications, especially the 'Critical Review' and the 'British Lady's Magazine.' At length however he found means to set up once more as bookseller in a small shop in Fleet Street. Here he was again unfortunate in having his premises twice broken into and plundered. In 1815, he became publisher of the 'Traveller' newspaper. In 1817 he commenced a weekly paper called 'The Reformists' Register.' The next year, he brought himself into great notoriety by a series of political satires, which had immense success, the effect partly of the wood-cut embellishments from the designs of Mr. George Cruikshank. Those of the series that turned out the most productive for the author were three composed in the manner of parodies upon various parts of the Book of Common Prayer. For the printing and publishing of these parodies Hone was brought to trial on three several indictments in the Court of King's Bench on the 18th, 19th, and 20th of December, 1817. He defended himself on all the three trials, which were before special juries, and, notwithstanding the best exertions of the bench to procure a conviction, was acquitted on each indictment. His acquittal was followed by the subscription of

considerable sum of money for his use, which enabled him to remove from Fleet Street to a large house on Ludgate Hill, where he continued a few years, but was unsuccessful. In 1823 he published the results of researches to which he had been originally directed with a view to his defence, in an octavo volume entitled 'Ancient Mysteries Described, especially the English Miracle Plays founded on Apocryphal New Testament Story extant among the unpublished MSS. in the British Museum.' In 1826 Hone began the publication, in weekly numbers, of his 'Every Day Book.' The sale was large, but his family had now increased to ten children, and he again got into difficulties; the end of which was that he was arrested by a creditor and thrown into the King's Bench prison. Here he remained for about three years, during which time he finished his 'Every Day Book,' in two volumes, and began and finished his 'Table Book,' in one volume, and also his 'Year Book,' in one volume.

During the latter years of Mr. Hone's life he was employed as sub-editor of the 'Patriot' newspaper. He died at Tottenham on the 6th of November, 1842.

HONEY is a fluid or semi-fluid substance, the materials of which are collected by different kinds of bees, in Europe chiefly by the *Apis mellifica*, or hive-bee [BEE], and solely by the neuter or working bees, from the nectariferous glands in the cup or chalice of flowers. It cannot be said to be a purely vegetable production, for, after being collected by the proboscis of the insect, it is transmitted to that distension of the œsophagus termed the crop, sucking-stomach, or honey-bag, where it is elaborated, and again disgorged, to be deposited in the cell of the honey-comb. It undergoes less change when the bees are very young, remaining nearly white, and is then denominated virgin honey. At all times it retains qualities derived from the kind of plant whence it has been procured, as is manifest not only by the peculiar odour of the honey, but by the effects which follow the use of honey obtained from certain plants, chiefly of the sub-tribe *Rhodoraceæ*, such as the azalea, rhododendron, kalmia, &c., which yield a honey frequently poisonous, while that from the genus *Erica* (termed Heather-Honey), and most *labiate* plants, is wholesome.

Honey is sweet, faintly aromatic, granular, soluble in water, and capable of undergoing the vinous fermentation, and so yielding an intoxicating drink called hydromel, metheglin, or mead. When diluted with water, it is rather demulcent, emollient, and refrigerant, and hence forms a good drink in fever and other inflammatory complaints, but it should not be taken if there be much gastric or intestinal irritation. It is used likewise in catarrhs, and when drunk warm is considered to be expectorant. Along with vinegar it forms a good gargle in slight cases of sore throat, and combined with borax a most efficacious application in aphthæ of the mouth and throat.

HONEYCOMB. [BEE.]

HONEYSUCKLE. [LONICERA.]

HONFLEUR. [CALVADOS.]

HONG KONG, one of the group of rocky islands situated at the mouth of the Canton River, about 37 miles S. from Macao, and 100 miles from Canton. One of its stations is in 22° 15′ N. lat., 114° 18′ E. long. The island is separated from the main land of China by a narrow strait, which varies in width from less than a mile to four or five miles. The island is about 8 miles long, with a breadth varying from 2 to 6 miles.

There is good anchorage at Hong Kong Roads and Victoria Harbour, both near the new town of Victoria. The northern side of the island is traversed by a ridge of mountains which vary in height from 500 to upwards of 1000 feet, three of the summits being 1575, 1711, and 1827 feet respectively. The southern side of the island is less mountainous. The cultivable land is small, but the supply of water is abundant. The climate is subject to great fluctuations, and is rather unhealthy.

Hong Kong was taken possession of by the British during the war with China, and was formally ceded to her by the Treaty of Nankin, August 30, 1842. On the 26th of June, 1843, Hong Kong was regularly constituted a British colony. It is what is called a crown colony, that is, it has no legislative assembly, but is governed by orders from the Colonial Office, London. There is a legislative and executive council to aid the governor with their assistance and advice. The governor, as superintendent of trade, is head of the consular establishments at the five ports opened in pursuance of the Treaty of Nankin. The offices of the government are at Victoria. There is a chief justice and attorney-general, with other law-officers, and the usual departments of a colonial administration. At the time when the British first occupied Hong Kong the number of Chinese inhabitants was supposed to amount to about 5000. The resident population consisted chiefly of fishermen and smugglers. Since the island became a British colony, there has been a great increase of Chinese. They make themselves generally useful as domestic servants, labourers, tailors, shoemakers, builders, carpenters, &c., and they become tenants of the little shops in the Chinese bazar. There is a small body of Chinese police. The command of cheap labour to any extent has been one great cause of the rapid progress of the town of Victoria, the building of which was not commenced till August 1841. A bishopric has been founded at Victoria, 1849. Land for other settlements in the island is granted on leases for 75 years at a stipulated rental.

Early in 1845 the Governor of Hong Kong legalised the opium trade, under stringent regulations. There is a tax on salt, and a duty of 2½ per cent. on sales by auction, added to a licence duty from the opium dealers.

In a despatch from the Governor (Sir J. F. Davis) dated March 13, 1847, he stated that the revenue of Hong Kong had increased from 9534*l.* in 1844 to 27,047 in 1846; that there was no custom-house, and that trade was entirely free; that the government expenditure had diminished; that 18 miles of good road were formed round the island; that the building of a large church had commenced—the first Protestant church in the con-

fines of China; that the English inhabitants, besides troops, numbered 618, including 167 females, and that the Chinese inhabitants numbered about 21,500; that the cultivation and drainage of the island had rendered it much more salubrious; that there were 4 European schools, and 13 Chinese schools, in the island; that, besides the English episcopal church, there were an episcopal chapel, four dissenting chapels, a Romish chapel, a Mohammedan mosque, and three Chinese temples.

American and Danish Consuls have been appointed at Hong Kong. The arrivals of ships were 334 in 1845, and 387 in 1846: the tonnage was 117,210 in 1845, and 130,199 in 1846.

HONG MERCHANTS. [CANTON.]

HONITON. [DEVONSHIRE.]

HONO'RIUS, son of Theodosius the Great, and younger brother of Arcadius, was born at Constantinople, A.D. 384. After the death of his father in 395 Honorius had for his share the Empire of the West, under the guardianship of Stilichon. Honorius fixed his residence at Milan. For several years after, Stilichon was the real sovereign of the West; and he also endeavoured to extend his sway over the territories of Arcadius in the East, under pretence of defending them against the Goths. He gave his daughter Maria in marriage to Honorius, and recovered the province of Africa, which had revolted. In the year 402 Alaric came a second time into Italy, when Stilichon hastily collected an army, with which he met Alaric at Pollentia, on the banks of the Tanaro, and obliged him to recross the Noric Alps. After this victory Honorious repaired to Rome with Stilichon, where they were both received with great applause. In the year 404 Honorius left Rome for Ravenna, which he made his residence, in consequence of which the province in which Ravenna is situated assumed the name of Romania, Romaniola, and afterwards Romagna, which it still retains. In the following year Radagaisus again invaded Italy with a large force of barbarians, but he was defeated and put to death by Stilichon. In the next year the Vandals, the Alani, the Alemanni, and other barbarians, crossed the Rhine, and invaded Gaul. Constantine in Britain usurped the imperial power, and, having passed over into Gaul, established his dominion there, and was acknowledged by Honorius as his colleague. Stilichon now began to be suspected of having an understanding with the barbarians, and he was put to death by order of Honorius, A.D. 408. His death was fatal to the empire. Alaric again invaded Italy, took Rome, and proclaimed the prefect Attalus emperor. [ALARIC.] The indecision and bad faith of Honorius brought Alaric again before Rome, which was plundered, A.D. 410. After Alaric's death his son Ataulphus married Placidia, sister of Honorius, and took possession of Spain. Honorius died at Ravenna, in August 423, leaving no issue.

HONORIUS I. II. III. IV. [POPE.]

HONTHORST, GERHARD, called by the Italians Gherardo dalle Notti, from his effects of light by night, was born at Utrecht in 1592. He was the pupil of A. Bloemart, studied some time in Rome, and was engaged for six months by Charles I. in England. There are several portraits by him at Hampton Court, for which he received 3000 florins, a service of plate complete for twelve persons, and a beautiful horse. Honthorst was the favourite painter of the Queen of Bohemia, and he was the court-painter to the Prince of Orange. He died at theHague in 1662.

HOOD, ROBIN, is supposed to have lived in the reign of Richard I. He was the most distinguished in his time of those numerous outlaws who under the tyrannical government of the early Norman kings lived in bands in all the great forests, and combined a sort of championship of the cause of the old national independence with the practice of deer-shooting and robbery. The chief residence of Robin Hood and his followers was the forest of Shirewood, or Sherwood, in Nottinghamshire; but he is said to have also frequented Barnsdale in Yorkshire, and Plumpton Park in Cumberland. 'The personal courage of this celebrated outlaw,' Bishop Percy observes, 'his skill in archery, his humanity, and especially his levelling principle of taking from the rich and giving to the poor, have in all ages rendered him the favourite of the common people.' His exploits appear to have been a common subject of popular song. Of Robin Hood's followers the most celebrated were, Little John, his chaplain called Friar Tuck, and his paramour named Marian. Amidst a variety of conflicting statements it is difficult to arrive at any distinct facts relating to this celebrated personage. He seems to have died in 1247.

HOOD, SAMUEL, VISCOUNT, was born Dec. 12, 1724, at Butley in Somersetshire, of which parish his father was the incumbent. He was brought up to the navy, and was appointed in 1757 to command the Antelope, 50 guns, in which he took a French 50 gun ship. In 1759, in the Vestal, 32 guns, he was again successful in capturing the Bellona, a French frigate of equal force. He served in the Mediterranean, under Sir Charles Saunders, till the end of the war in 1763, and was appointed to command on the Boston station in 1768. In 1778 his services were rewarded with a baronetcy. In 1780 he was promoted to the rank of rear-admiral, and sailed with a squadron to the West Indies to join Sir George Rodney. By Rodney's departure to England, in 1781, Hood succeeded to the command of the fleet. The events of the war called him almost immediately to America. In Jan. 1782, the French invaded the island of St. Christopher. Hood hastened to relieve it; but, notwithstanding a dexterous manœuvre, he was unable to prevent the surrender of the island. His conduct in the whole of this affair has been warmly applauded by naval critics. After the action of April 12, 1782, in which the French fleet in the West Indies, under the Comte de Grasse, was defeated by the British fleet under Admiral Rodney, Hood, who commanded a part of the fleet and greatly distinguished himself, was created an Irish peer by the title of Baron Hood of Catherington, and Rodney returned finally to England, leaving Lord Hood again in the chief command, which he retained till the peace of 1783. In the memorable West

minster election of 1784 Lord Hood opposed Fox, and was returned at the head of the poll. He lost his seat on being made a lord of the admiralty, in 1788, but was re-elected in 1790. In 1793 he was appointed to command the Mediterranean fleet, and an arduous responsibility devolved on him in consequence of the surrender of Toulon to the British and Spanish fleet by the French royalists. Early in 1794 Lord Hood applied himself to the expulsion of the French from Corsica, which was accomplished chiefly by the astonishing exertions of the British sailors on shore, especially in the capture of Bastia, for which Lord Hood received the thanks of both houses of parliament. His health being much impaired, he returned to England at the close of the year. In 1796 he was appointed governor of Greenwich Hospital, and raised to the English peerage by the title of Viscount Hood of Whitley. He afterwards received the Grand Cross of the Bath. He died at Bath, in his ninety-second year, June 27, 1816.

HOOD, ALEXANDER, VISCOUNT BRIDPORT, younger brother of the above, was also brought up to the navy, and also found many opportunities of signalising his skill, activity, and bravery. He was made rear-admiral in 1780, and in 1782 sailed as second in command of the fleet sent under Lord Howe to relieve Gibraltar. He held the same rank in the Channel fleet, under the same commander, in 1794, and bore a distinguished part in the great victory of the 1st of June. In 1795 he engaged a French fleet off L'Orient, and took three ships of the line; and in the following year was appointed to the command of the Channel fleet, which he held till April 1800. He was successively raised to the Irish and English peerage by the titles of Baron and Viscount Bridport, the last creation June 10, 1801. Lord Bridport died at Bath, May 3, 1814. The title is now extinct.

HOOD, THOMAS, was born in 1798, in the Poultry, London, where his father was a bookseller of the firm of Vernor and Hood. In 1811 Hood's father died, and his mother sent him to a day-school. From this school he was removed to the counting-house of Messrs. Bell and Co., Russia merchants, Warnford Court, City, but his health soon began to fail, and he went to Dundee, where, after a residence of two years, he returned to London, and engaged himself to Mr. Robert Sands, an engraver, who was his uncle, in order to learn his art, and was afterwards with Le Keux for the same purpose.

Hood had published some trifles in the 'Dundee Advertiser' and 'Dundee Magazine.' In 1821 he succeeded Mr. John Scott as editor of the 'London Magazine.' His first publication in a separate form was 'Odes and Addresses to Great People,' in which he was assisted by his brother-in-law, J. H. Reynolds, and which was brought out anonymously. 'Whims and Oddities,' published in 1826, in small 8vo., consisted chiefly of his contributions to the 'London Magazine,' with some additions. His next work was in prose, 'National Tales,' sm. 8vo., which was followed by 'The Plea of the Midsummer Fairies, Hero and Leander, Lycus the Centaur, and other Poems,' sm. 8vo., 1827, a volume of serious poetry, which obtained praise from the critics, but little favour from the public.

He published a second series of his 'Whims and Oddities,' and a third series in 1828. He commenced the 'Comic Annual' in 1829, and it was continued nine years. In the same year his comic poem of 'The Epping Hunt' came out. He was for one year editor of 'The Gem,' and wrote for it his poem called 'Eugene Aram's Dream.'

In the spring of 1831 Hood became the occupier of a house called Lake House, in Essex. While residing here he wrote his novel of 'Tylney Hall.' Pecuniary difficulties compelled him to leave his pleasant residence in 1835. The 'Comic Annual' having terminated in 1837, Hood commenced the publication of 'Hood's Own,' in a series of monthly numbers, in 8vo., 1838. Hood afterwards went to the continent for the benefit of his health: he was in Belgium when he published his 'Up the Rhine.' On his return he became editor of the 'New Monthly Magazine;' after his retirement from which, in 1843, he collected his contributions to that work, and, with additions of prose and poetry, published them under the title of 'Whimsicalities.' He still continued to suffer from ill health.

In 1844 Hood started his last periodical, 'Hood's Magazine,' and continued to supply the best of its contributions till within about a month before his death. Those who have read the work, and have a taste for wit, humour, and character, will not readily forget his 'Schoolmistress Abroad,' and his novel of 'Our Family,' which was interrupted by his last illness and death: the last chapters were in fact written by him when he was propped up by pillows in bed. He had the consolation, a short time before his death, of having a government pension of 100*l.* a year offered to him by Sir Robert Peel, which was transferred at his own request to his wife. He died May 3, 1845, and was buried in Kensal Green Cemetery.

HOOFT, PETER CORNELIUS, one of the most eminent poets and prose writers of Holland, was born on the 16th of March, 1581, at Amsterdam, where his father was an eminent burgomaster. He wrote 'Granida,' and several other tragedies, and may be considered in some degree as the founder of the Dutch stage. His tragedies are composed on the Greek model, and have choruses. In his lesser poetical productions he displays more originality, and many of them are distinguished by playfulness and elegance. He also formed a correct and harmonious style of prose, of which his 'History of the Netherlands' is esteemed a model. He died May 21, 1647.

HOOGE, PETER DE, was born about 1643, but the place of his birth is uncertain, as well as the master under whom he studied. His pictures, of which there are some capital specimens in England, sell at high prices.

HOOGEVEEN, HENRY, was born at Leyden in January 1712. His parents were in humble circumstances. He filled successively the office

of rector at the gymnasiums of Kuilenburg, Breda, Dort, and Delft, at the last of which places he died in 1791.

The principal work of Hoogeveen is a treatise on the Greek Particles (2 vols. 4to., Leyd., 1769), of which an abridgment was made by Schütz (Leip., 1806); one of the most useful of his works, entitled 'Dictionarium Analogicum Linguæ Græcæ' was published after his death at Cambridge, in 1800.

HOOGLEY. [Calcutta; Hindustan.]

HOOK, THEODORE EDWARD, was born September 22nd, 1788, in Charlotte Street, Bedford Square, London. He was the son of James Hook, a musical composer of some celebrity, by his first wife (Miss Madden). There was only one other child by that marriage, Dr. James Hook, dean of Worcester.

Theodore Hook was a handsome boy and remarkably clever. He had a fine ear, was an expert performer on the pianoforte, and had a sweet and powerful voice. His father was employed at Vauxhall and the theatres, and Theodore wrote songs for him, and sometimes composed the airs. In 1805 he wrote an operatic farce, 'The Soldier's Return,' which was very successful. He afterwards wrote several other successful operatic pieces and farces. In 1809 he made his first essay as a novelist by the publication of 'The Man of Sorrow.' It was a very flimsy work, and had no success.

Hook was even at this period distinguished for his conversational powers, but his talent as an *improvisatore* is described as extraordinary. He was invited to perform before the Prince Regent, who was so much delighted, that in 1812 he got him appointed accomptant-general and treasurer to the colony of the Mauritius, with a salary and allowances amounting to nearly 2000*l.* a year. He reached his destination Oct. 9, 1813. In 1817 a large deficiency in the assets of the office was discovered; an investigation took place, and Hook was arrested on the 9th of March, 1818; all his property was seized, and he was sent back to England in custody. The result of an examination of the matter by the law-officers of the crown was a claim from him of 12,000*l.*

The 'John Bull' newspaper was established soon after Hook's return, and he became the editor. Hook, in its prosperous state, received full 2000*l.* a year from it; and, though its circulation gradually diminished, he derived a considerable profit from it up to the time of his death. In August 1823, Hook was arrested under a writ of Exchequer, his property was sold, and realised about 40*l.*, and he was taken to a spunging-house, where he remained till April 1824, whence he was transferred to the Rules of the King's Bench, and he remained there till May 1825, when he was released from custody, but with an intimation that the crown abandoned nothing of its claim for the debt: he then took a cottage at Putney.

Hook published his first series of 'Sayings and Doings' in Feb. 1824, while confined in the spunging-house, and his diary records the profit to have been 2000*l.*; and he realised sums almost as large by the novels and other works which he published in rapid succession afterwards. The following is a list of the whole of them:—'Sayings and Doings,' First Series, 3 vols., 1824; Second Series, 3 vols., 1825; Third Series, 3 vols., 1828; 'Maxwell,' 3 vols., 1830; 'Life of Sir David Baird,' 2 vols. 8vo., 1832; 'Parson's Daughter,' 3 vols., 1833; 'Love and Pride,' 3 vols., 1833; 'Gilbert Gurney,' 3 vols., 1835; 'Jack Brag,' 3 vols., 1837; 'Births, Deaths, and Marriages,' 3 vols., 1839; 'Gurney Married,' 3 vols., 1839; 'Precepts and Practice,' 3 vols., 1840; 'Fathers and Sons,' 3 vols., 1840; 'Peregrine Bunce,' 3 vols., 1841, some months after his death. In 1836 he became editor of the 'New Monthly Magazine.' He wrote Kelly's 'Reminiscences,' from Kelly's notes, in 1836, without remuneration.

While residing at Putney he gradually mixed more and more freely in society, and in 1827 took a house in Cleveland Row, St. James's; he became a member of divers first-rate clubs, received invitations from persons of the highest distinction, and ran himself rapidly and deeply into debt, notwithstanding the large sums which he obtained by his literary labours. By his extravagance, which he supplied at a ruinous expense of labour of mind and body, his constitution was completely broken up. He died Aug. 24, 1841, in the 53rd year of his age.

The 'Life and Literary Remains of Theodore Hook' have been recently published in 2 vols. 8vo., edited by the Rev. R. Dalton Barham.

HOOKE, ROBERT, was born July 18, 1635, at Freshwater, in the Isle of Wight, of which parish his father was minister. After studying successively at Westminster and Oxford, he was engaged to assist Dr. Wallis in his chemical experiments, and he subsequently served Mr. Robert Boyle in a similar capacity. In 1662 he was appointed curator of experiments to the Royal Society; and, when that body was incorporated by charter the following year, Mr. Hooke was one of those Fellows who were first nominated by the council. In 1664 he succeeded Dr. Dacres as professor of geometry in Gresham College, and two years afterwards received the appointment of city surveyor. In 1677 he succeeded Oldenburg as secretary to the Royal Society. In 1691 he was created Doctor of Physic, by a warrant from Archbishop Tillotson. He died at Gresham College in 1702, in his 68th year. A list of the works left by Dr. Hooke is given in Ward's 'Lives of the Gresham Professors.'

HOOKE, NATHANIEL, died in 1764. The date of his birth is unknown. He was a Roman Catholic, enjoyed the friendship of Pope, and was intimate with most of his eminent literary contemporaries. He is said to have lost his fortune in the South Sea scheme. The work by which Hooke is principally known is entitled 'The Roman History, from the Building of Rome to the Ruin of the Commonwealth,' which was originally published in 4 vols. 4to., 1733-1771. Hooke also published a work on the Roman senate in answer to Dr. Middleton's and Dr. Chapman's treatises on the same subject, 175

and translated from the French the 'Life of Fenelon,' 1723, and Ramsay's 'Travels of Cyrus,' 1739.

HOOKER, RICHARD, was born at Heavytree, near Exeter, about 1553 or 1554. He was introduced by his uncle, the chamberlain of Exeter, to the notice of Bishop Jewel, who procured him, in 1557, a clerkship in Corpus Christi College, Oxford. In December 1573, he became a scholar of that college, and a fellow and master of arts in 1577. In 1579 he was appointed lecturer of Hebrew in the university, and in October of the same year he was expelled his college, with Dr. John Reynolds and three other fellows, but restored the same month. In about two years he took orders, and was appointed to preach at Paul's Cross, London. Through the influence of the Archbishop of York, he was appointed Master of the Temple in 1585, and was presented to the living of Boscombe in Wiltshire, in 1591. On July 17 in the same year he was made a prebendary of Salisbury. On July 7, 1595, he was presented to the living of Bishopsbourne in Kent, which he held till his death on the 2nd of November, 1600. His great work is his defence of the constitution and discipline of the Church of England, in eight books, under the title of 'The Laws of Ecclesiastical Polity.'

HOOLE, JOHN, was born in London, in 1727. At the age of seventeen he became a clerk in the East India House. He is chiefly known for his translation of Tasso's 'Jerusalem Delivered,' London, 1763, 2 vols. 8vo. It is a diffuse and feeble version. He published also a translation of Ariosto's 'Orlando Furioso,' 5 vols. 8vo. He translated many of the dramas of Metastasio; and he wrote three or four tragedies, which were unsuccessful. He died in 1803.

HOOPER, JOHN, one of the most venerated martyrs of the Reformation, was born in Somersetshire about 1495, and educated at Oxford. In 1550 he was appointed bishop of Gloucester; but his assumption of the office was long delayed by his scrupulousness as to the use of the episcopal dress. By way of overcoming his reluctance, he was confined to his own house, and finally committed to the Fleet Prison. His friends exhorted him to compliance, and at length the matter was compromised. In 1552 he received the bishopric of Worcester in commendam. Wood says, 'When Queen Mary began to reign, in July 1553, he was pursuivanted up to London, in the latter end of August, and committed to the Fleet, where, remaining some months, he was at length examined several times, and required to recant his opinions, but, standing constant and resolute to them, was condemned to be burnt in Jan. 1555.' He suffered, Feb. 9, at Gloucester, bearing his torments with great courage.

HOOPING-COUGH. This disease, to which, on account of the violence of the cough that attends it, the Latin term *Pertussis* has been applied, has also obtained the popular designation Chin or Kink-Cough.

It commences with the symptoms of simple catarrh, and is indicated by cough and the expectoration of a clear limpid fluid, by redness of the conjunctivæ, a watery discharge from the eyes and nostrils, hoarseness, and occasional sneezing. These symptoms are attended by some degree of fever, which in general however is very slight; the patient is languid and out of spirits, but is free from pain, or complains only of soreness in the anterior part of the chest. At the end of a period varying from one to two weeks, the fits of coughing become longer and more frequent; each fit is commonly announced by a sensation of tickling in the larynx and trachea, during which the inspirations are irregular and incomplete, especially in children, whose countenances are at this time expressive of fear and anxiety. At the moment the fit comes on they cling with firmness to the persons or objects around them; if asleep at the time of its accession, they suddenly start up and place themselves in a sitting posture. The efforts of coughing are now repeated in such quick succession as to suspend almost completely the act of breathing: during their brief intervals we can with difficulty perceive any inspiratory movements, excepting at times when the cough is momentarily interrupted by a prolonged inspiration attended by a peculiar whooping noise, which has supplied a name for the affection, and which constitutes its characteristic symptom. In consequence of the obstruction to the circulation occasioned by these long-continued efforts of coughing, the face and neck become swelled, and of a deep red or violet colour; the veins on these parts are distended almost to bursting; the eyes are prominent and bathed in tears; occasionally the patient becomes completely exhausted; the fit of coughing is interrupted for one or more minutes; it then recurs with the same violence, and the patient seems in imminent danger of suffocation, when the paroxysm is terminated by one or two long and whooping inspirations, and by the rejection of a limpid viscid fluid, which hangs in threads from the mouth. This fluid comes from the bronchi and pharynx, and sometimes also from the stomach; it is occasionally mixed with particles of blood. These paroxysms or fits of coughing continue for many minutes, and when they are very severe blood frequently issues from the nose, mouth, ears, or even from the eye-lids; they recur at various and often very short intervals, generally however more frequently and with greater severity by night than by day, and they are excited by the slightest causes, as by food or exercise, by any agitation or mental emotion. In the intervals of the fits the child appears to have its ordinary health.

After the affection has presented the characters which we have described for a period which varies from two or three weeks to as many months, the paroxysms become shorter and less frequent, and the cough ceases to be characteristic, but still continues to terminate in vomiting and in the discharge of sputa, which now resemble those of catarrh. The paroxysms become more and more rare, in some cases recur at regular intervals, and finally cease, but for some time afterwards they are easily renewed by any unusual exposure to cold.

Hooping-cough prevails epidemically, and chiefly

attacks children from birth to the period of second dentition, but it occasionally occurs in adult and even in old age. It rarely affects the same individual more than once, although this sometimes happens, and it is one of those diseases that are communicable by contagion.

No method of treatment has hitherto been discovered by which the progress of hooping-cough can be arrested. We may mitigate its severity and somewhat diminish its duration, but it will run a certain course, and this course, in spite of all our efforts, will often be long. In the early stage emetics may be given repeatedly, and at a more advanced period great benefit is derived from the employment of narcotic and sedative medicines, of which opium, hydrocyanic acid, and belladonna are the best; but, on account of the powerful influence of these drugs on the system, the greatest caution should be observed in their administration to children.

HOORN. [HOLLAND.]

HOPE, THOMAS, was descended from the wealthy family of the Hopes of Amsterdam. He was born in London, in 1770, and gave very early indications of his attachment to architecture. At the age of eighteen or nineteen he went abroad, and travelled for about eight years in various parts of Asia and Africa, as well as on the continent of Europe.

Soon after his return to England he began to apply his studies practically by remodelling and enlarging his mansion in Duchess Street, Portland Place. He thus rendered his house one of the largest private mansions in the metropolis, and fitted up and furnished the interior in a style of classical taste that was then a novelty in this country. His publication on 'Household Furniture,' in 1805, created a revolution in taste.

In 1809 appeared his 'Costume of the Ancients;' and in the same year he contributed to a periodical (by J. Landseer) entitled 'Review of Publications of Art,' an essay on the 'Architecture of Theatres.'

With the exception of a minor work entitled 'Modern Costumes,' in 1812, Mr. Hope did not publish anything further till 1819, when appeared his 'Anastasius, or Memoirs of a Modern Greek at the close of the Eighteenth Century.' His last two works, both of them published posthumously, are, 'the Origin and Prospects of Man,' and an 'Historical Essay on Architecture.' Mr. Hope died Feb. 3, 1831.

HÔPITA'L, or HOSPITA'L, MICHEL DE L', born in 1505, near Aigueperse in Auvergne, was the son of Jean de l'Hôpital, physician to the Connétable de Bourbon. L'Hôpital remained in the university of Padua six years, during which the Connétable de Bourbon lost his life under the walls of Rome, and Jean de l'Hôpital found himself without a protector in a foreign land. After practising for some time at the bar of the parliament of Paris, his merit, added to his having married the daughter of the lieutenant-criminel Morin, procured for him a seat on the bench of the counsellors of the parliament. The Duchess of Berri, daughter of Francis I., invited L'Hôpital to her court, and recommended him to the king, Henri II., who appointed him superintendent of the finances. L'Hôpital endeavoured to check prodigality and corruption. He also opposed the persecution of the Protestants. On the death of the chancellor Olivier, in 1560, L'Hôpital succeeded him. He strenuously opposed the Cardinal de Lorraine, who wanted to establish the Inquisition in France; and his next thought was that of assembling the states-general, which had not met for eighty years, but the Guises opposed the proposal. L'Hôpital accordingly contented himself with assembling the nobility and high clergy at Fontainebleau. The only useful result of the assembly was the passing of an ordonnance prepared by L'Hôpital, which abolished arbitrary taxes, regulated the feudal authority of the nobles, and corrected many abuses in the judicial system. Soon after, July 1561, L'Hôpital obtained from the regent Catherine an edict, ordering the release of all prisoners suspected of heresy. By another edict Roman Catholics were forbidden, under pain of death, from forcing an entrance into the houses of Protestants under pretence of dispersing their meetings. After the death of the Duke of Guise, 1563, L'Hôpital prevailed upon Catherine to grant the edict 'of peace,' by which, among other conditions, all prisoners on both sides were released, and the Protestants were allowed the exercise of their religion within the towns which they had occupied during the war. He also prevailed upon Catherine to declare the majority of her son Charles IX. L'Hôpital's opposition to the bull of the Pope, by which the king was authorised to levy 100,000 crowns a year on the revenues to root heresy from the kingdom, caused his downfall; the seals were taken from him, and he retired in 1568 to his country-house at Vignay, where he died March 15, 1573.

HÔPITAL, GUILLAUME-FRANÇOIS-ANTOINE L', Marquis de Sainte Mesme and Count d'Entremont, commonly known as the Marquis de l'Hôpital, was born at Paris, in the year 1661. He entered the army at an early age, and served some years as a captain of cavalry. His name is intimately connected with the early history of the differential and integral calculus. In 1691 no knowledge whatever of the calculus existed in France, and indeed throughout the Continent it appears to have been known only to Leibnitz, and to the brothers John and James Bernoulli. About this time John Bernoulli arrived at Paris, and spent some time at the residence of L'Hôpital for the purpose of giving him instruction in the differential and integral calculus. With such assistance he was not long in becoming one of the first mathematicians of Europe, and he soon after distinguished himself by his solution of the great problem in mechanics relative to the brachystochron, or curve of quickest descent, which Bernoulli had proposed as a challenge to the geometricians of the day, and to which, at the end of ten months, only four solutions had been given, by Newton in England, Leibnitz in Germany, James Bernoulli in Switzerland, and L'Hôpital in France. Still however

the calculus was regarded as a sort of mystery by most of those mathematicians by whom it was not actually opposed; and, with the exception of the papers by Leibnitz dispersed in the Acts of Leipzig, there existed no work from which any information could be obtained. To remedy this defect he wrote and published his 'Analyse des Infiniment-Petits,' which appeared in 1696, Paris, 4to. 'The appearance of this work,' says M. Boucharlat, 'marked the epoch of a great revolution in science. Mathematicians hastened to initiate themselves into the wonders of the infinitesimal calculus, and doubts concerning its truth were advanced only by those who were blinded by their prejudices in favour of ancient methods.' At his death in 1704, when only 43 years of age, L'Hôpital left an 'Analytical Treatise on Conic Sections,' which was published in 4to. the following year, and was for a long time considered the best treatise on the subject.

HOPPNER, JOHN, R.A., was born in London in 1759. When young, he was one of the choristers in the Chapel Royal. He studied afterwards in the Royal Academy; and before he was thirty years of age he had, owing to the active patronage of the Prince of Wales, painted more royal and noble portraits than usually falls to the lot of distinguished portrait painters during the whole of a long life. Hoppner's style is easy and effective, but gaudy. He died of dropsy in 1810. His son was for some years British consul at Venice.

HOPS (Botany). [HUMULUS LUPULUS.]

HOPS (*Humulus lupulus* of Linnæus) are extensively cultivated for the flowers or seed-vessels, which give flavour and permanence to beer by being boiled with the wort in brewing.

Hops were introduced into England from Flanders about the year 1524. The most extensive plantations are in Kent, Sussex, and Herefordshire; but they are also cultivated in Worcestershire, Wiltshire, Hampshire, Gloucestershire, Surrey, and several other counties. The hop is a slender climbing plant, which requires a very rich mellow soil and careful cultivation. The soil of a hop-garden must be rich to a considerable depth, or made so artificially.

The young plants are raised in beds, and may be raised from seed; but it is more usual to plant the young shoots which rise from the bottom of the stems of old plants. The varieties most esteemed are the Grape Hop, the White Vine, and the Golden Hop. The young plants are placed in groups of three each, about six inches asunder, in the midst of prepared masses of soil about a yard asunder. A watering with liquid manure greatly assists their taking root, and they soon begin to show bines. A stick three or four feet long is then stuck in the middle of the three plants, and the bines are tied to this stick with twine or the shreds of Russia mats, till they lay hold and twine round it. During their growth the ground is well hoed and forked up around the roots, and some of the fine mould is thrown around the stems. In favourable seasons a few hops may be picked from these young plants in the autumn, but in general there is nothing the first year. Early in November the ground is carefully dug with the spade, and the earth, being turned towards the plants, is left so all the winter.

In the second year, early in spring, the hillocks around the plants are opened and the roots examined. The last year's shoots are cut off within an inch of the main stem, and all the suckers quite close to it. A pole about twelve feet long is then firmly stuck into the ground near the plants; to this the bines are led and tied as they shoot, till they have taken hold of it. The ground being well hoed and the earth raised round the plants, the produce this year will average 4 cwt. per acre if the season is favourable.

In September the flower containing the seed will be of a fine straw colour, turning to a brown; it is then in perfection. No time should now be lost in picking them. The hops when picked are dried on a hair cloth in a kiln. They are then laid in heaps on the floor, where they undergo a very slight heating. As soon as this is observed, they are bagged. This is done by pressing them into large bags suspended below a hole in the floor; when sewed close and tight, the bag is stored in a dry place till the hops are wanted for sale.

The crop of the third year will average 8 cwt. per acre, but will in some cases reach 15.

The hop is a diœcious plant, *i. e.* some of the individuals are male plants and others female, which have respectively flowers of a different construction and of different habitudes; and the pollen of the former is conveyed by the air to the latter. Though the pollen, from its extreme lightness, can be wafted to a considerable distance, and some seeds in each cone may be so fertilised, yet it would be well to rear a number of the male plants among the others, or along the hedges of the hop-gardens, to insure the fertilisation of all the seeds.

The poles are an expensive article; those of chestnut are the most durable, and also the dearest. They should be put into a shed during winter; or else be placed on end in the form of a cone, leaning against each other.

Besides the use of hops in brewing, they produce a bitter infusion and a tincture which are valuable in medicine for complaints in the stomach.

The number of acres of hops in England, in 1847, was 52,327½; the quantity charged with duty was 45,134,365 lbs.; and the duty realized was 394,923*l.*

HORAPOLLO, or HORUS APOLLO, the author of a treatise on Egyptian Hieroglyphics. Champollion, and Leemans, in his edition of the work, are disposed to attribute greater importance to it than former critics had been willing to allow. The best edition is by Leemans, Amst. 1834.

HORARY (Astronomy). The horary motion of the sun or a planet is the arc which it describes in one hour, or the angle which that arc subtends at the eye of the spectator.

HORA'TIUS, FLACCUS QUINTUS, was born at Venusia, December 8, B.C. 65. His father, who was a *libertinus*, or freedman, acquired some property (1 'Sat.,' vi. 6, 86), with which he purchased a farm near Venusia, on the banks of the Aufidus. In this place Horace appears to have lived till his eleventh or twelfth year, when his father removed with his son to Rome, where he was placed under

the care of a celebrated schoolmaster, Orbilius Pupillus, of Beneventum. After studying the ancient Latin poets (2 'Ep.,' i. 70, 71), Horace learned the Greek language (2 'Ep.,' ii. 41, 42). He also enjoyed during the course of his education the advice of his father, who was a sensible man, and is frequently mentioned by his son with the greatest respect. About the age of seventeen, he went to Athens to pursue his studies (2 'Ep.,' ii. 43-45), where he was, when Brutus was raising troops to oppose Octavianus Cæsar and M. Antonius. He joined Brutus, was promoted to the rank of a military tribune (1 'Sat.,' vi. 48), and was present at the battle of Philippi, B.C. 42. Though the life of Horace was spared, his paternal property at Venusia was confiscated, and he repaired to Rome with the hope of obtaining a living by his literary exertions. Some of his poems attracted the notice of Virgil and Varius, who introduced him to Mæcenas, whose liberality relieved the poet from all pecuniary difficulties.

From his introduction to Mæcenas till the time of his death, Horace appears to have enjoyed exemption from all cares: he was intimate with Virgil, Tibullus, and other distinguished literary men in Rome, and was a great favourite of his patron Mæcenas and also of Augustus. He resided principally at Rome, or at his country-house in the Sabine valley, which had been given him by Mæcenas. He also had in the latter part of his life another country residence at Tibur (Tivoli). Horace died on the 27th November, B.C. 8, when he had nearly completed his 58th year.

The works of Horace have been printed by Mr. Tate, under the title of 'Horatius Restitutus,' in the order in which Bentley supposes that they were written, Camb., 1832. The Satires and Epistles, which are familiar moral discourses, and not poetry in the usual acceptation of the word, are the most valuable of his works. The Odes, which are little more than translations or imitations of the Greek poets, are generally written in a very artificial manner. The best are those in which the poet describes the pleasures of a country life, or touches on the beauties of nature, for which he had the most lively perception and the most exquisite relish; nor are his lyrical productions altogether without those touches which excite our warmer sympathies. The qualities in which Horace excels are good sense, judgment, and purity of taste.

The following are the most esteemed editions of Horace:—Lambinus, 1561; Heinsius, 1629; Bentley, 1711; Burmann, 1713; Sanadon, 1728; Mitscherlich, 1800; the edition of Baxter, edited by Gesner and Zeune, frequently printed; Döring, 1828-9; Braunhard, 1833; and Orelli, 1837-8 and 1843-4. Horace has been translated into almost all the European languages, both in prose and verse. A few of the Odes and Satires have been well translated into English; but there is no good English translation of all his works.

HORDEIN, a peculiar vegetable product found in barley. It is a yellowish powder, insoluble in water. It is not found in pearl-barley, and is therefore supposed to be contained in the husk only.

HO'RDEUM, the genus of plants to which the corn called Barley belongs. As many as fifteen species of *Hordeum* are distinguished by Professor Kunth, the latest writer upon the subject; in addition to which there are many varieties. The species are found wild in various places in both the Old and New World: as many as eight inhabit America.

H. distichum is the common summer Barley of England, and that which cultivators seem to prefer; its ears are not so large as those of *H. hexastichum*, but the grains are heavier. It is commonly stated to be a native of Tartary.

H. gymnodistichum, Naked Barley, a species but little cultivated now, is of unknown origin.

H. Zeocriton, Battledore Barley, or Sprat Barley, is little cultivated in England, because of the shortness of its straw; its native country is unknown.

H. hexastichum. The native country of this species is unknown. It is the Bere, Bigg, or Winter Barley of farmers, and is particularly valuable for ripening quicker than the common two-rowed Barley, but its grains are lighter. To northern nations with short summers it is however invaluable.

H. gymno-hexastichum is extremely productive, and in some parts of Europe it is reckoned the most valuable of all. The French call it, on account of its good qualities, *orge céleste*.

H. Ægiceras, a most curious species, found in the northern parts of India, and probably in Tartary, as its grains have been sent to England under the name of Tartarian Wheat. Its appearance is more that of wheat than of barley, and its naked grains assist the resemblance. It is however a genuine species of *Hordeum*. It appears to be a productive plant, but little is as yet known of its quality in this climate.

Of most of the species there are many varieties, the most striking of which are those called Black Barleys, on account of the dark colour of their husks.

HORIZON (*ὁρίζω*, bounding). The physical horizon is the apparent circle by which the spectator's view is bounded when he is upon a level and uninterrupted plain, such as the surface of the sea. It differs from the astronomical horizon in two points; firstly, because the physical horizon dips, as it is called, or is not at the same level as the eye; and secondly, because the astronomical horizon always supposes the spectator to be at the centre of the earth, and not at the surface.

The plane of the horizon at any place is perpendicular to the direction of a plumb-line, or parallel to the surface of any fluid at rest. At sea when it is necessary to take the altitude of any heavenly body, the physical horizon is, in tolerably fair weather, sufficiently well defined for the purpose, and, with proper allowance for its dip, is used accordingly. But, in land observations with a sextant or other instrument requiring an horizon the surface of a fluid (generally mercury) is used which is called an artificial horizon, but might more properly be termed an artificial portion of the horizontal plane.

HORMISDAS. [Pope.]

HORN. The structure of such horns as those of the ox, antelope, goat, and sheep may be described as a number of conical sheaths inserted into one another, the innermost of which lies upon the vascular membrane which covers the bony core. The tip, or that portion of the point of the horn which projects beyond the core, is very dense, and the several layers of which it is composed are scarcely distinguishable; while towards the base the layers may be readily distinguished, owing to their successive terminations forming prominent rings. Horn appears to consist of coagulated albumen; and there is a certain chain of connection between the substance of horns, nails, claws, hoofs, the scales of animals of the armadillo and tortoise kind, of lizards, serpents, and fishes, hair, feathers, and even skin.

The principal kinds of horn employed in manufacturing operations are those of oxen. The first process is to remove the bony core or pith, which is accomplished by steeping the horns in water for several weeks, by which operation the membrane which lies between the core and the horny sheath is so destroyed or softened by putrefaction that the cores may be easily extracted. These are applied to many useful purposes. The solid tip of the horn is sawn off with a frame-saw, and is employed for making knife-handles, umbrella-handles, the tops of whips, buttons, and various other articles. The remainder of the horn, which is employed for purposes for which thin laminæ are required, may either be left entire or sawn into two or more lengths, according to the use to which it is to be applied. When divided, the lower part, or that next the root of the horn, is frequently employed for making combs, while the portion which has formed the middle of the horn is used for lanterns and for other articles where a thin plate of horn is required. To prepare the horn for use it is softened in boiling water; and, while hot from this operation, it is held in the flame of a fire until it acquires about the temperature of melting lead, and becomes so soft as to be semi-fluid. The slitting is performed while it is in the semi-fluid state, by a strong pointed knife resembling a pruning-knife; and, by the application of two pairs of pinchers, one to each edge of the slit, the cylinder or cone of horn is opened until it is nearly flat. Several such pieces are then exposed to pressure between alternate plates of iron until they are flattened. The thin sheets of horn are then scraped, rubbed, and polished.

The various articles made of horn require manufacturing processes differing in different cases. The making of combs is noticed elsewhere. [Comb-Cutting.] Umbrella-handles, snuff-boxes, knife-handles, bell-pulls, drawer-knobs, &c., are made by softening the horn to such a degree that it may be pressed into moulds.

Horn is easily dyed of various colours; but in this country it is usually coloured of a rich reddish brown, and spotted to imitate tortoiseshell, by a mixture of pearl-ash, quicklime, and litharge, or red lead, with water and a little pounded dragon's blood.

No part of the refuse of the horn manufacture is without its value. When exposed to a decomposing heat in close vessels, horn produces a large quantity of the gaseous compound which forms the base of prussic acid, on which account hoofs and horn cuttings are in great request among the manufacturers of Prussian blue, and of the beautiful yellow prussiate of potash. The clippings of the comb-maker and of the lantern-maker are also used as manure.

HORN, a musical wind-instrument of very ancient origin, and of various forms.

The *French Horn* is a tube of about ten feet, very narrow at top, widening considerably at the bottom, and bent in rings for the convenience of the performer. It is not provided with holes, as the flute, &c.; the production of the various sounds depending upon the lips of the player, the more or less pressure of his breath, and the insertion of the hand in the bell, or wide end, of the instrument. Crooks and shifting-pieces are provided to adjust the instrument to different keys, or fundamental notes.

Music for the Horn is always written in the key of C, an octave higher than played, and in the treble clef; and the key in which the instrument is to be tuned is indicated by the composer.

The *Bugle Horn* is a tube of three feet ten inches in length, doubled up in a small compass. The *Keyed Bugle*, or a Bugle Horn with keys, is that now in common use, the scale of which comprehends about two octaves, with the semitones. The *Cornopean* and the *Cornet-à-Pistons* are improved modern forms of this instrument.

The *Russian Horn* is an unbent brass tube, conical in shape, of various dimensions: the deepest toned is eight feet long, and nine inches in diameter at the wide end, and the highest is two inches and a half in length, by one at the wide end. The former gives A, an octave below the first space in the base; the latter gives E, the third additional line above the treble. Some of these horns have keys, producing one or two semitones, but generally every note has its separate horn; and a band of Russian Horns counts almost as many individuals as diatonic notes in a scale of between four and five octaves.

Basset Horn. [Basset Horn.]

The *English Horn*, or *Corno Inglese*, is a deeper-toned oboe, but of rather larger dimensions, somewhat bent, the lower end very open, and is to the latter what the basset horn is to the clarinet; or what the viola is to the violin. The tone of this instrument is extremely pathetic, and by the Italians is thought so much to resemble the human voice, that they sometimes call it the *voce umana*. The scale of the *Corno Inglese* is from A below the treble staff, to B ♭ above, or two octaves and a semitone.

HORN, CAPE. [Cape Horn.]

HORNBEAM. [Carpinus.]

HORNBILL, *Hornbill Family*, *Buceridæ*, a group of birds of considerable size, characterised at once by the enormous and disproportionate development of their beak, and of certain cellular casques or processes surmounting the upper mandible. The generic details may be summed up as follows.

Genus *Buceros*.—Bill long, very large, and compressed, more or less curved or falcated; base smooth, elevated, or rather surmounted by a casque or helmet-like protuberance; edges of the mandibles smooth or notched; point smooth; interior of the bill, especially the upper mandible and casque, very cellular; nostrils basal, on the surface of the beak, in a furrow, small, somewhat round, open, pierced in the corneous substance of the bill, covered at the base by a membrane. Feet short, strong, muscular; sole of the foot large. Wings moderate; the first three quills graduated; the fourth or fifth the longest.

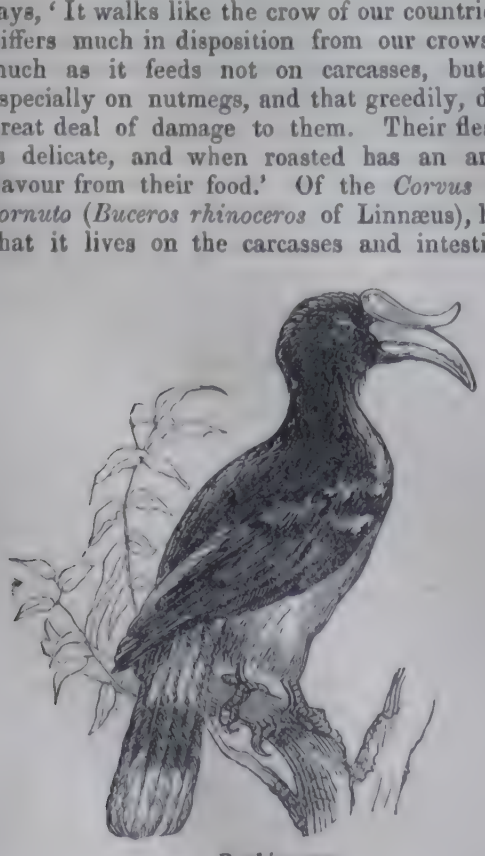
Geographical Distribution.—Africa, India, and the island of New Guinea.

In the 'Proceeds. Zool. Soc.' for 1833 will be found an account of the dissection of a young *Buceros cavatus* by Professor Owen, who concludes his details with some observations on the affinities of the Hornbill deducible from its anatomy. Its nearest approach is to the Toucan; the toucan however, in the want of a gall-bladder, agrees with the parrots; the presence of that organ in the Hornbill places the bird in more relation with the crows. The disposition of the intestine in long and narrow loops also agrees with the raven. The tongue, so remarkably varied in form and use among the Scansores, resembles in the Hornbill that of the carnivorous birds.

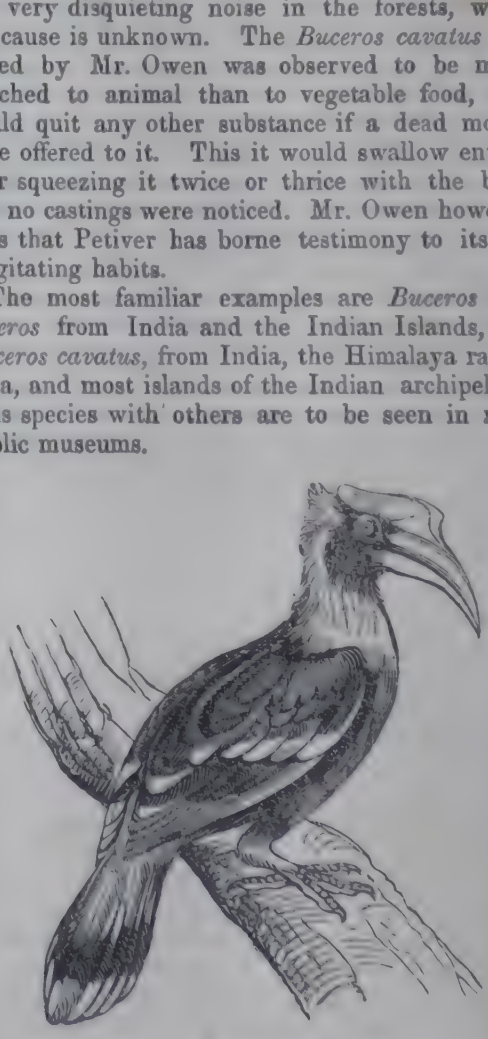
For the opinion of various naturalists as to the place these birds hold in the class *Aves*, the writings of Brisson, Linnæus, Latham, Lacépède, Duméril, Illiger, Cuvier, Vieillot, Temminck, Vigors, De Blainville, Lesson, Swainson, and others may be consulted.

Habits, &c.—Bontius, in his description of the *Corvus Indicus* (*Buceros hydrocorax*, Linn.), says, 'It walks like the crow of our countries, but differs much in disposition from our crows, inasmuch as it feeds not on carcasses, but most especially on nutmegs, and that greedily, doing a great deal of damage to them. Their flesh also is delicate, and when roasted has an aromatic flavour from their food.' Of the *Corvus rostro-cornuto* (*Buceros rhinoceros* of Linnæus), he says that it lives on the carcasses and intestines of animals, and that it waits upon the hunters who kill wild cattle, boars, and stags, to gorge itself with the entrails of those animals. Cuvier considers the Hornbills as omnivorous; and he states that they eat tender fruits, hunt mice, small birds, and reptiles, and do not even disdain carcasses. The late Major-Gen. Thomas Hardwicke, who contributed so largely to our acquaintance with Indian animals, in treating of *Buceros galeatus* ('Linn. Trans.,' vol. xiv.), gives the following description of the habits of the Hornbills:—'The progressive motion of the birds of this genus, although their feet are formed for walking, is always by jumping or hopping. I have kept several species alive, and they all moved in the same manner. In a state of nature these birds, in this part of India (Malacca), live on wild fruits. In confinement they feed freely on plantains and on boiled rice. At night they perch with great security, though the largeness of the foot seems better suited to rest on the ground.' M. Lesson sums up the habits of the Hornbills thus:—Those of Africa live on carrion; those of the East Indies seek for fruits, especially nutmegs, and their flesh acquires from them a delicious flavour. Their flight is performed by repeated strokes of the wings, and the air which they displace, joined to the clattering of their mandibles, occasions a great and very disquieting noise in the forests, when the cause is unknown. The *Buceros cavatus* dissected by Mr. Owen was observed to be more attached to animal than to vegetable food, and would quit any other substance if a dead mouse were offered to it. This it would swallow entire, after squeezing it twice or thrice with the bill; and no castings were noticed. Mr. Owen however adds that Petiver has borne testimony to its regurgitating habits.

The most familiar examples are *Buceros rhinoceros* from India and the Indian Islands, and *Buceros cavatus*, from India, the Himalaya range, Java, and most islands of the Indian archipelago. This species with others are to be seen in most public museums.



B. rhinoceros.



B. cavatus.

HORNBLENDE. [AUGITE.]

HORNBLENDE SCHIST is a mineral c

monly associated with gneiss, less frequently with mica schist, and seldom forms alone any considerable mountain mass. It follows the contortions of gneiss, and is traversed like it by granite veins.

HORNCASTLE. [LINCOLNSHIRE.]

HORNE, GEORGE, D.D., Bishop of Norwich, was born Nov. 1, 1730, at Otham, in Kent. He was appointed principal of Magdalen College, Oxford, in 1768; in 1776 vice-chancellor; in 1781 dean of Canterbury; and in 1789 bishop of Norwich. He died Jan. 17, 1792, in his 62nd year. Dr. Horne paid particular attention to the study of Hebrew and sacred literature; in which he adopted many of the principles of Hutchinson. The most celebrated of his works is his 'Commentary on the Book of Psalms,' which was originally published at Oxford, 2 vols. 4to., 1776, and has since been frequently reprinted.

HORNE TOOKE. [TOOKE.]

HORNER, FRANCIS, was born, Aug. 12, 1778, in Edinburgh, where his father was a merchant. He was educated at the High School; in 1792 he matriculated at the University of Edinburgh, where he pursued his studies till the summer of 1795. He studied Scotch law with his friend Henry Brougham, and with another friend, Lord Webb Seymour, he studied metaphysics and political economy.

In 1802 Horner began to have thoughts of exchanging the Scottish for the English bar, and in the spring of 1803 he took up his permanent residence in London. His opinions had led him to association with the Whigs, and, on the death of Mr. Pitt in 1806, he accepted a seat at the Board of Commissioners established by the East India Company for settling the Nabob of Arcot's debts; and he was returned to parliament for St. Ives. Fox had died in September, and a new parliament was summoned. This parliament was very short-lived. Horner did not obtain a seat at the next general election, but in the following July was elected for the borough of Wendover through the interest of Lord Carrington. In the general election in 1812 he was not returned, but by the intervention of Lord Grenville he was elected for St. Mawes. In the sessions of 1813 and 1814 he took a prominent part in the debates, particularly on questions of finance and currency, and became one of the acknowledged leaders of his party. On June 25, 1816, he made his last speech in parliament, in favour of the Catholic claims. He died at Pisa, Feb. 8, 1817.

HORNET. [VESPIDÆ.]

HORNPIPE, a rustic musical instrument, still, we believe, known in Wales, consisting of a wooden tube, with holes, and a reed. It went out of general use in the early part of the last century.

Hornpipe is also the name of a dance, supposed to have been originally composed for the instrument known by the same name. Hawkins says that the hornpipe was invented in this country.

HORNU. [HAINAULT.]

HORNWORK, a piece of fortification formerly much in esteem. It was situated in advance of the principal works of a place. The rampart of its front, on the plan, is similar to that which is formed on each side of the polygon supposed to surround a regular fortress; and on each flank a line of rampart returning from the nearest extremity of the front terminates on the ditch either of a bastion or ravelin on the enceinte of the place. The work was generally strengthened by a ravelin placed before the curtain between its two demi-bastions, and by a covered-way and glacis beyond the ditch; these return along the branch or wing on each side, and join the covered-way and glacis of the collateral bastion or ravelin of the enceinte.

The length of the front did not generally exceed two-thirds of the extent of that which is usually called a front of fortification for the enceinte of a place; but, when space was required for buildings to lodge troops, stores, &c., two or more fronts were joined together; in which case the piece had the name of double, triple, &c. Hornwork, but more generally Crownwork. The old hornworks were very defective, and are disused; but, in certain situations, a new disposition of advanced fronts is advantageously employed.

HOROLOGIUM (Constellation), the Clock, a southern constellation of Lacaille. It is cut by a line passing through Canópus to the southern part of Eridanus.

HOROLOGY (from the Greek ὥρα, time, or hour, and λόγος, a discourse), an explanation of the principles of the measurement of time; but in its modern sense the term is usually applied as descriptive of that art which comprehends a knowledge of the action of the various machines used for the purpose of measuring time. We have noticed CLEPSYDRA and SUN DIAL; and we confine our present attention to clocks and watches.

History of Clock- and Watch-Making.—The first author who has introduced the term *horologium* as applicable to a clock that struck the hours appears to be Dante, who was born in 1265, and died in 1321. It would appear from this, that striking clocks were known in Italy as early as the latter part of the thirteenth or beginning of the fourteenth century. There is known to have been some such kind of clock at quite as early a period in England; but it is considered probable that the next following century produced the first clock properly so called, the term *horologium* having previously included many kind of time measurers. Many allusions to celebrated clocks, in France, Italy, Germany, and Holland, are to be met with, belonging to the 14th and 15th centuries. It is now believed that a regulated clock was not the invention of one man, but a compound of successive inventions, each worthy of a separate contriver.

De Wyck's clock, made in 1364 for the Emperor of Germany, had two pallets worked by a crown-wheel, and two weights on a lever to regulate the movement to time. In 1484 Walthas made a balance-clock for astronomical observations. In 1560 Tycho Brahé had four clocks which indicated hours, minutes, and seconds; the largest of which had only three wheels, one having 1200 teeth. In 1577 Moesthin had a clock whose beats enabled him to determine approximately the apparent diameter of the sun. At what time watches or small clocks were introduced, by the use of a mainspring instead of a weight as the

moving power, is not known; but it is supposed to have been in the early part of the 16th century. Galileo's discovery of the isochronism of the pendulum paved the way for the introduction of pendulum clocks; and it is probable that both Galileo and Huyghens had constructed pendulum clocks before 1648, though some writers say that Richard Harris made a pendulum clock a few years earlier, viz. in 1641. In 1676 Barlow, a London clock-maker, invented the repeating mechanism by which the hour last struck may be known by pulling a string. Several artists followed in the same line, particularly Quare, in London, and Julien le Roy, Collier, Larçay, Thiout, &c., on the Continent. Clocks were soon after this made to show not only mean but apparent time.

Clement, a London clockmaker, invented in 1680 the anchor-escapement, which was a great improvement on the crown-wheel before in use; he also introduced the practice of suspending the pendulum by a thin and flexible spring. The next important improvement was the adjustment of the length of the pendulum to the varied effects of heat and cold. In 1715, George Graham, by substituting a jar of mercury for the pendulum-ball, succeeded in retaining the point of suspension and the centre of oscillation at the same distance from each other. The principal objection to this pendulum is its liability to breakage, of which its author felt the full force, and in consequence suggested the idea of the opposite expansions of different metals as a compensation for a pendulum. John Harrison immediately turned his attention to the subject, and, by dint of perseverance overcoming all the difficulties of his humble and retired situation, not only astonished the world by his improvements in horological machines, but absolutely constructed with his own hands a timekeeper which determined the longitude within such limits as to procure him the parliamentary reward of 20,000*l*. [HARRISON.] Although the anchor-escapement previously mentioned was a great improvement upon all that had preceded it, still it was subject to objections, not one of the least of which was that at every vibration a considerable recoil took place. The inconveniences of this escapement were however removed (about the same time with the invention of Harrison's pendulum) by Graham, who introduced what is called the dead-beat escapement, which is both simple and effective.

After what has been advanced, it might be supposed that the clock had received its finishing stroke as regarded its further improvement; but, even after this, we find so many alterations, if not improvements, in the escapement, mode of compensation, &c., that to notice only those which have produced some sensation at the time of their introduction would fill a volume.

Description of an Eight-Day Clock.—The wood-cuts employed to illustrate clock and watch work are so very embarrassing to non-technical readers, that we will endeavour to give a slight description of an eight-day clock in words only. There are two barrels containing springs, one to give motion to the train of wheels called the 'going' train, and the other to the 'striking' train. The first of these springs gives motion to a wheel called the main wheel, which in its turn acts upon several other wheels, the time of rotation of which corresponds with that of the minute and hour hand. The last wheel of this system acts upon two little levers or pallets, which give an alternating motion to the pendulum of the clock. A *fusee*, which is a kind of spiral system of grooves, is fitted to the main wheel, and enables the main wheel to maintain an equable motion during the varying pulling force of the spring. All the above-named wheels belong to the *going* train. There is a somewhat similar train belonging to the *striking* action; but the teeth of the wheels, instead of being so cut as to facilitate the movement of two index hands, act upon certain pins and levers which move the hammer belonging to the bell: this part of the mechanism is exceedingly beautiful, especially when the clock strikes the quarters.

The action of such a clock, then, is this. Once in eight days the clock is 'wound up,' which consists in coiling up the going spring very tightly in its barrel. In its efforts to uncoil itself, the spring forcibly pulls round the main wheel, with which it is placed in connection; and the fusee causes this motion to go on pretty steadily and equably. As the main wheel cannot rotate without moving the train of wheels to which it is connected, all these latter also rotate, with a velocity depending on the number of teeth which act on each other. In two of the wheels these numbers are so regulated that the wheels revolve in one hour and twelve hours respectively; and the axes of these wheels serve as axes for the minute and hour hands. Meanwhile the second spring gives motion to the second train of wheels, which are so connected with the going wheels as to enable the bell-hammer to be moved at the proper time. One of the many kinds of pendulum, concealed behind or within the clock, is set in motion by one of the wheels, and, by its isochronous or 'equal-timed' vibrations, tends to give regularity to the movements of the wheels generally.

Large Pendulum-Clocks.—Turret-clocks differ from other machines employed for measuring time, not only in their greatly superior size, but because such a clock is frequently required to indicate the time upon as many as four different dials, on the four external faces of the tower in which it is mounted. This is accomplished by placing the clock near the centre of an apartment, and causing the motion of the axis which under ordinary circumstances would carry the minute-hand (which revolves once in an hour), to be transmitted by bevil-gear to a vertical rod, the opposite end of which carries a horizontal bevil-wheel nearly on a level with, and situated centrically with reference to, the four external dials. The motion of this central wheel is communicated, by four vertical bevil-wheels of the same size and number of teeth, ranged round its circumference, to four horizontal rods, the opposite ends of which, passing through the several dials, carry the four minute-hands. At the back of each dial is a series of wheels and pinions, by which motion

is imparted to the hour-hand, which revolves once in twelve hours. In a turret clock, the moving power is supplied by the descent of a weight, regulated in the case of the movement, or going-train, by the oscillations of a large pendulum, and in that of the striking train by the resistance of the air to the rapid revolutions of a fly or fan set in motion by the wheelwork. Owing to the necessity for using a very heavy hammer to strike the hours in a church clock, the power required for working the striking-train considerably exceeds that of the going train.

Musical chimes require the addition of another train of mechanism, somewhat like that which constitutes the striking train.—The mechanism of the chimes very nearly resembles, on a large scale, that of a musical snuff-box, levers, connected with hammers which strike upon a series of bells, being substituted for the springs which in the musical snuff-box are caused to vibrate by the projecting pins on the revolving barrel.

In the new Royal Exchange clock, made by Mr. Dent, many improvements have been introduced. There is a simple but strong cast-iron framing, which enables the several parts of the clock to be put together with less strain than usual. The wheels for the striking train are made of cast iron; more durable and less costly than the usual gun-metal wheels. The wheels of the going train, smaller and requiring to be more nicely adjusted than those of the striking train, are made of hammered brass. Hollow iron drums are used instead of wooden cylinders for the driving barrels, and wire instead of hemp or ropes for suspending the weights. It was required, by the terms of contract, that this most admirable clock should have a compensation-pendulum, and that it should be so constructed as not only to show perfectly correct time upon the dials, but also to tell it with accuracy by making the first stroke of the hour upon the bell true to a second. This object is attained by a beautiful arrangement of mechanism. In this clock has also been introduced a beautiful contrivance for maintaining the motion of the wheels during the time of winding up, which was invented a few years since by Professor Airy for the clock-work of the great Northumberland telescope at the university of Cambridge.

Mechanism of a Watch.—A pocket-watch is very similar in principle to a good clock, except that the regulation of the former is by a balance and spring, and that of the latter by a pendulum. It would be a matter of some difficulty to determine what artist first reduced the portable spring-clock to the dimensions of a watch to be worn in the pocket. The small clocks prior to the time of Huyghens and Hooke were very imperfect machines; they did not even profess to subdivide the hours into minutes and seconds until the invention of the balance-spring, which is to the balance what gravity is to the pendulum, and its introduction has contributed as much to the improvement of watches as did that of the pendulum to clocks. The honour of this invention was warmly contested by the last-named individuals previous to 1658; but, so far as priority of publication is concerned, the honour is due to Hooke.

When clocks and watches had acquired a certain degree of accuracy in their performance, the time lost in winding up (especially when it had to be done every twenty-four hours) became a matter of importance, and there have been several inventions to remedy this evil. By Huyghens the clock was kept going while winding up by means of an endless cord. The *fore-going spring* gives another plan, in which a lever is so adjusted as to allow the wheels free movement, while the spring barrel is being acted on by the key. But Harrison's contrivance for the same purpose is the one now in general use, both in clocks and watches, and is admirably adapted to the purpose, as it requires no attention from the person who has to wind up the machine, but is always in its place, and ready for action the moment the operation of winding is commenced. It is generally called the *going fusee*, but a better name for it is *maintaining power*. The principle of its action depends on the mode in which the fusee is fixed into a socket connected with the main wheel, so as to allow the wheel and the fusee to rotate independently of each other when required.

The word *escapement* is a term applied to a combination of parts in a clock or watch, which has for its object the conversion of the circular motion of the wheels into a vibratory motion, as exhibited in the pendulum. The component parts include the scape-wheel, the pallets with their arbor or axis, and a bent lever attached thereto, called the crutch, which last piece maintains the motion of the pendulum. In a watch this combination consists of the scape-wheel, together with all those parts lying between it and the balance, and which are concerned in converting the circular motion of the wheels into the alternating one of the balance. The pallets act upon or between the pointed teeth of the scape-wheel by a reciprocal or oscillatory motion.

In a common *Vertical Watch*, the barrel containing the spring is near one edge; and next to it is the fusee. The spring within the barrel, formed by a narrow strip of highly tempered steel, is fastened at one end to the interior of the barrel, and at the other to the axis or arbor of the barrel. A fine steel chain runs from the exterior of the barrel to the exterior of the fusee; and, when the watch is wound up by the application of the watch-key to the arbor of the fusee, the chain is drawn from off the cylindrical surface of the barrel, and wound on the grooved surface of the fusee. In this process the spring within the barrel becomes coiled round very tightly; and, it is the recoil or resistance of the spring which slowly pulls the chain back again to the barrel, and causes the fusee to rotate. The fusee is concentric with a toothed wheel, whose teeth act upon those of a second wheel, and those upon a third, and so on throughout the delicate machine: one wheel rotating with such a velocity as to enable an index hand upon its axis to mark hours, another minutes, another (in a seconds-watch) seconds, and another to act upon the regulating or pendulum apparatus.

One of the chief distinctive features in watches, and the one by which the name or designation is

often determined, is the nature of the escapement. The *duplex* escapement, so named from a French watchmaker, is much more intricate than the escapement of a common vertical watch. A *vertical watch* has the escapement perpendicular to the face of the watch, while a *horizontal watch* has the escapement so formed parallel to the face of the watch. A *lever watch* has an escapement differing from all the others, which is preferred to those of either the vertical or horizontal watch. Earnshaw's *detached escapement*, intended chiefly for chronometers, is considered to excel all others for the accuracy of its performance.

The term *repeater*, or *repeating watch*, is applied to those watches which, in addition to showing the time on the dial, are supplied with mechanism for giving audible indication of the time when required. In an eight-day spring clock, the number of blows given by the hammer to the bell corresponds with the hour denoted by the hand of the clock; and there is an arrangement by which the pulling of a string may be made to denote the hour which was *last* struck. But, from the peculiar mechanism involved, there are about ten minutes in every hour during which this repeating could not be produced. The filling up of this deficiency is an object in a repeating watch or clock. Some of these watches strike only the hours and quarters; while others, called minute-repeaters, strike the minutes also. In a common watch, the wheels and pinions which are placed between the frame-plates constitute the *going train*; while the wheels and pinions placed between the uppermost frame-plate and the dial, serving to communicate the motion from the centre wheel to the index-hands, constitute the *motion-work*; but, in addition to these, a repeating watch has another system of mechanism, called the *repeating train*, for the purpose of transmitting the movement from the motion-work to the hammers which are to strike the hours and quarters.

Some of the distinctive features of the more scientific watches or time-keepers are noticed under CHRONOMETER.

HORREBOW, PETER, a Danish astronomer, was born in the year 1679. After studying medicine for several years, he became the pupil of the celebrated mathematician and astronomer Olaus Roemer, whom, in 1710, he succeeded as professor in the University of Copenhagen. Horrebow died at Copenhagen in 1764, at the advanced age of eighty-five years, leaving a considerable number of works. His son Christian, also an astronomical author, died in 1776.

HORROCKS, JEREMIAH, often written Horrox, an astronomer who has obtained a lasting celebrity, though he died at the age of twenty-two, or thereabouts. Jeremiah Horrocks was born, it is supposed, about the year 1619, at Toxteth near Liverpool. His father, a man of moderate means, placed him, before 1633, at Emmanuel College, Cambridge, and there he soon began to turn his attention to astronomy. During the time in which the court and parliament were occupied in the disputes which led to civil war, four men, three of them very young, and all personally acquainted with each other, were employed in advancing the theory and practice of astronomy. Three of them died very young, and their names had almost perished, and would probably have been lost, but for the more than usual talents of Horrocks. Though his papers which Horrocks left behind him contain many good observations and ingenious remarks, he must now be considered as known by two particulars. He was the first who saw Venus on the body of the sun, and he was the first who remarked that the lunar motions might be represented by supposing an elliptic orbit, provided that the eccentricity of the ellipse were made to vary, and an oscillatory motion were given to the line of apsides. Newton afterwards showed that both suppositions were consequences of the theory of gravitation.

The account given by Horrocks of his observation of Venus, November 24, 1639, entitled 'Venus in Sole visa,' was printed by Hevelius at the end of his 'Mercurius in Sole visus,' published at Danzig in 1662. The remainder of the works of Horrocks were published by Dr. Wallis, London, 1672, some copies bearing the title-page 'Opera Posthuma,' and others 'Opuscula Astronomica.' The death of Horrocks took place January 3, 1641 (old style).

William Crabtree, who died a few months after his friend Horrocks, at a very early age, was a clothier at Broughton near Manchester, and many of his observations were printed by Wallis in the work above cited, and afterwards in the discussion about Gascoygne, presently to be mentioned.

William Milbourn, curate at Brancespeth near Durham, was, according to Sherburne, well versed in algebra, having extracted the approximate root of an equation of the fifth degree before he had seen Harriott's work. In astronomy he had, by his own observations, detected the errors of Lansberg's tables, and verified those of Kepler.

William Gascoygne, of Middleton in Yorkshire, was killed, also at an early age, fighting for Charles I. at Marston Moor. He invented methods of grinding glasses, and Sherburne states that he was the first who used two convex glasses in the telescope. When Auzout announced, in 1666, his invention of the micrometer, Richard Townley, nephew of Christopher Townley, presented Hooke with a modification by himself of a similar instrument made by Gascoygne; and it appeared, from a letter written by Crabtree to Horrocks, that Crabtree had seen Gascoygne use an instrument of the kind. It appears now to be generally admitted that Gascoygne was the original inventor of the wire micrometer, of its application to the telescope, and of the application of the telescope to the quadrant; but that the invention was never promulgated, even in England, until the undoubtedly independent inventions of Auzout and Picard had suggested their publication.

HORSE, the family of *Equidæ*. Cuvier places the horse in the solipedous section of the Pachydermata, quadrupeds which have only a single toe on each limb apparent, incased in a hoof, although there are on each side of the metacarpus and metatarsus stylets which represent two lateral toes. Cuvier considers that one genus only is comprehended in this group or family, viz. *Equus*, the

characters of which he gives as follows. In each jaw six incisors, which in youth have their crowns hollowed by a pit, six molars on each side above and below, with a square crown, showing four crescentic pits, besides which, in the upper teeth is a little disc on the internal edge. The males, moreover, have two small canine teeth in the upper jaw, and sometimes in both jaws: these are almost always wanting in the females. Between these canines and the first molar is a vacant space which corresponds to the angle of the lips; it is here that the bit is placed, by means of which alone man has come to subdue these vigorous quadrupeds. The stomach is simple, and of moderate size; but the intestines are very long, with an enormous cæcum. The teats are inguinal.

Gmelin, in his 'Systema Naturæ,' gives a species of horse which he calls *Equus bisulcus*, the *Equus pedibus bisulcis* of Molina, 'Hist. Nat. Chili.' This was a Llama, and Gmelin was deceived by the term Equus used by Molina. We shall pass over as unworthy notice all the various fabulous kinds of horses, described by Aldrovandus and others.

Mr. Gray considers the *Equidæ* as consisting of two genera, viz. *Equus* and *Asinus*, and many modern zoologists have adopted his views.

In *Equus*, the mane is long and flowing, the tail densely covered to its root with long hair, the hinder legs as well as the fore-arms are furnished with warty callosities. In the coat of the horse moreover there is a disposition to the formation of small round spots or rings of a different shade or hue from that of the ground; and this is the case whether the general colour be black, chestnut, or gray.

In *Asinus* the mane is short, meagre, and upright; the tail is furnished with long hair only towards its extremity; there are warty callosities on the fore-arms, none on the hinder limbs. The ground-colour of the coat is more or less whitish (in the wild species), always with a distinct dorsal line of a dark tint, with stripes or bands of the same colour more or less pervading the body and limbs.

Col. H. Smith separates from the genus Asinus those species which are banded like the Zebra, and applies to them the title of *Hippotigris*, but this cannot be considered as a generic section.

Genus *Equus*.

The Horse (*Equus Caballus*), in a state of domestication, varies in size from the massive and gigantic dray horse to the diminutive Shetland pony. Its colour is also as variable as its size, ranging through white, cream-tint, gray, mottled, iron-gray, dun, bay, chestnut, black, &c. It moreover presents us with different strains, how produced originally it is not easy to say; certainly the high-blood racer and the slight meagre Arab present strong contrasts in their contour and capabilities to the heavy Flanders horse and the huge dray horse rising from 18 to 20 hands high at the withers. Between these two extremes there are numerous intermediate breeds, some adapted for the chase, some for carriages and light-wheeled vehicles, some for the traveller's saddle, and some for farm-house labour. Ponies again, a small variety of the horse, show differences of a like nature—some are finely formed, full of mettle and courage, and show high blood—others are clumsy and ill formed, though strong and hardy; and the intermediate gradations are numerous.

It would appear that the horse was first domesticated or reclaimed in the east, that it was brought with the hordes migrating westward from Asia, and was thus introduced into Arabia and Egypt, and that we must look to the deserts north of Hindustan and Persia as its cradle, or at least as the locality in which it first became subject to man.

It would appear from their fossil remains that various species of horse were once spread over Europe, Asia, and even North and South America. Fossil remains of a horse were brought home by Captain Beechey from the mudcliffs of Eschscholtz Bay, in North America; they were found associated with the remains of the Mammoth and fossil ox. To this we may add Mr. Darwin's observation, that 'horses' bones mingled with those of the mastodon have several times been transmitted for sale from North America to England; but it has always been imagined, from the simple fact of their being horses' bones, that they had been accidentally mingled with the fossils.' In South America Mr. Darwin found the fossil tooth of a horse, together with one of the extinct toxodon at Santa Fé, in the red clayey stratum of the Pampas, and also part of another tooth at Bahia Blanca, imbedded with numerous other remains of extinct *Edentata*, in a beach which was covered at spring tides. In the caverns of Minas Geraes, a mining district of Brazil, the relics of a species of horse have been found in considerable abundance.

With the mastodon, the megatherium, the mylodon, &c., the indigenous horse has long disappeared from America; but in the present day man has refilled its place by the importation of the domestic stock from Europe, and now on the pampas and the prairies, troops of wild horses scour the plain in perfect freedom, the descendants of a domestic race born and reared in slavery.

Formerly, according to Oppian and Pliny, wild horses existed in Scythia, Thrace, along the Danube, and even in Europe: according to Varro, they were found in Spain. Oppian says that wild horses existed in Æthiopia; and, according to Julius Capitolinus, it was from Africa that the Gordianus procured eighty wild horses for the spectacles of Rome. Leo Africanus states that wild horses inhabited the deserts of northern Africa, an assertion to which Pennant alludes. Col. H. Smith describes a wild horse, solitary in its habits, called the Koomrah (*Equus Hippagrus*, Smith), which dwells in the mountain forests of North Africa and Guinea. A living specimen from Barbary, and the skin of another from Guinea, came under the Colonel's examination. (For details the reader may consult the volume on 'Horses,' in the 'Naturalist's Library,' written by Col. H. Smith, and 'The History of the Horse,' by Mr. W. Martin.)

Genus *Asinus*.

Of this genus one species has been domesticated

from the earliest ages, and is now spread over nearly all the world. We allude to the Ass (*Asinus vulgaris*), the subdued descendants of one of the wild species which roam the great Asiatic deserts. We may here observe that the members of the present genus are comparatively numerous, and are divided between Asia and Africa.

Some confusion appears to obtain among the Asiatic species of *Asinus* which requires yet to be cleared up. The following is the result of our researches.

1. The Dziggetai, Djiggtai, &c. (*Asinus hemionus*, Pallas), the great wild ass, or Ghoor-Khur, characterised by a simple dorsal line, without a shoulder-stripe. Locality, Persia, Bucharia, Tartary, Tibet, South Siberia, and India. Specimens from Cutch and Sinde have been kept in the gardens of the Zoological Society. It is gregarious, migratory, and very swift.

2. The Khur, or wild ass of Persia, described by Sir Robert Kerr Porter (*Asinus Hamar*, Col. H. Smith). Mane black, no dorsal stripe or cross; smaller than the Dziggetai, with the head heavier in proportion; swift.

3. The Kiang (*Equus kiang*, Moorcraft), described by Moorcraft, and which he says is decidedly not the wild ass (dziggetai) of Scinde. Locality, the eastern parts of Ladakh. Colour light reddish chestnut; jaw, neck, legs, and belly white; mane dun; ears moderate; height about 14 hands; swift. Very little is known of this species.

4. The Onager, Koulan, or Wild Ass (*Equus onager*), the reputed origin of our domestic race. [Ass.] A distinct dorsal stripe and crossbar over the shoulder. In winter the coat of this species becomes fine and undulated. Gregarious, migratory, fleet. Locality, the country of the Kirgis, the Bucharians, and Kalmucs, and northern Persia. It is also found west of the Euphrates, and in Syria, Arabia Petræa, and Northern Africa.

5. The Yo-To-Tzé (*Asinus equulus*, Col. H. Smith). The specimen Col. H. Smith describes and figures was said to have come from some part of Chinese Tartary. Height about 3 feet. General colour reddish clay; tips of the ears, mane, and long hair on the tail, black; black dorsal line and broad cross bar; three or four cross streaks over the knees and hocks.

Perhaps the Koomrah of North Africa and the Wild Ass of the same region are identical. The Koomrah figured by Col. H. Smith is more asinine than equine in appearance.

The African species are:—

1. The Zebra (*Asinus zebra*). Locality, mountain districts from Caffraria eastward to beyond Mozambique, perhaps to Adel and the south of Abyssinia; but this is not certain: gregarious.

2. The Dauw, or Burchell's Zebra (*Asinus Burchellii*). Locality, the vast plains of Southern Africa north of the Gariep.

3. The Quagga (*Asinus quagga*). Locality, the plains of South Africa.

4. The Congo Dauw, or Hippotigris of the ancients, and exhibited in the Roman spectacles. Locality, Abyssinia and Nigritia. The legs are not striped to the hoof as in the zebra. This species is termed by Col. H. Smith *Hippotigris Antiquorum*. If an admitted species, it may stand in the present arrangement as *Asinus hippotigris*. It is closely allied to the dauw.

5. The Isabella Quagga (*Asinus Isabellinus*), a wild ass of a pale yellow colour, seen by Le Vaillant in large herds in South Africa. We do not know that any other travellers have seen it. Species doubtful.

Hybrids.

The ass and horse breed together. The offspring of a male ass and a mare is termed a mule—of a female ass and a horse, a hinney. The latter is valueless; not so the former. Mules have been produced from the mare and the quagga. The following mules of the equine family have been produced and reared in the gardens of the Zoological Society.

1. Mule between Burchell's dauw (male) and ass (female). 2. Mule between common zebra (male) and ass (female). 3. Mule between dziggetai (male) and ass (female); fleet and beautiful. 4. Mule between zebra and Exmoor pony; the mule very little striped about the legs. 5. Mule between zebra and dziggetai.

We can here only briefly allude to a strange physiological fact, that the characters of the male parent of the mother's first progeny show themselves in her subsequent offspring by other males. A young mare belonging to the Earl of Morton, after producing a female hybrid by the quagga, had afterwards a filly and then a colt by a fine black Arabian horse. Both resembled the quagga in the dark line along the back, the stripes across the forehead, and the bars across the legs. In the filly the mane was short and stiff; in the colt it was long, but so stiff as to arch upwards and hang clear of the sides of the neck. In other respects they were nearly pure Arabian.

The fossil remains of *Equidæ* are abundant and widely spread through the pliocene period of the tertiary series. The species appear to have been numerous.

Economical Uses and Diseases of the Horse.—The horse is naturally herbivorous; his thin muscular prehensile lips, his firm and compressed mouth, and his sharp incisors, are admirably adapted for the purposes of seizing and cropping the grass; so flexible indeed are the lips, that the horse can pick up with ease the last few grains of oats in the manger. The crushing power of the grinders is extraordinary, the muscles of the lower jaw being of vast volume and energy; hence vegetable fibres, grass, grain, &c., are comminuted to a pulp. Nevertheless, it is doubtful whether in his natural condition the horse would select grain, were it obtainable, in preference to grass. The grinders in time become much worn by its attrition, and in many old horses the grain is only partially crushed, and consequently affords little nutriment. Hence, as a general rule, grain should be bruised before being put into the manger.

As the age of a horse is ascertained by an inspection of its teeth, or rather its incisor teeth called nippers, a knowledge of the process of dentition, and of the exact character of the incisors at different periods of a horse's life, is indispensable

to the veterinarian, the dealer, and the purchaser. But let not the purchaser, however knowing he may think himself, trust to his own judgment. So many artful and indeed barbarous tricks are played by horse-dealers to give an apparent age to a colt, and thereby enhance its value, and after maturity to give the teeth that appearance which they would have when the animal had but just attained to its prime of vigour, that even good practical men are often deceived. For details of these matters we refer our readers to Youatt's valuable treatise on the Horse in the 'Farmer's Library.' A succinct account will also be found in Martin's 'History of the Horse,' in Knight's 'Weekly Volume for all Readers.'

The general management of the horse is a matter of serious consideration. The treatment of the foal, the best time for weaning (at 5 or 6 months old), the breaking in of the colt, and the proper method to be pursued (on the principle of kindness, not of tyranny or brutal usage) according to the breed and destination of the animal; the training of the racer, the hunter, the roadster, the coach-horse; the amount of labour to be exacted from the working horse in the waggon, the cart, the plough; the diet required under every different phase of labour, and at different seasons of the year; the kind of water (soft, if possible) to be given, and the quantity daily under different circumstances;—all these are most important matters to be attended to.

Again, with respect to the anatomical structure of the foot; the qualities of the hoof; the nature and use of the frog; the bearing of the pastern bones on the coffin bone, with their ligaments, tendons, nerves, and blood-vessels; and the inference to be drawn, on physiological principles, as to the proper method of shoeing the hoof, according to the destined work of the animal and the nature of the ground upon which it has to work;—these form additional points of great importance to which the veterinarian has to devote deep attention.

What is the proper *conformation of the Horse?* This varies essentially with the breed and destination of the animal. Nevertheless there are some points which are valuable in horses of every description. The head should not be disproportionally large, and should be well set on, *i. e.* the lower jaw-bones should be sufficiently far apart to enable the head to form that angle with the neck which gives free motion and a graceful carriage to it, and prevents its bearing too heavy on the hand. The eye should be large and a little prominent, and the eyelid fine and thin. The ear should be small and erect, and quick in motion. The lop-ear indicates dulness or stubbornness; and, when it is habitually laid too far back upon the neck, there is too frequently a disposition to mischief. The nostril in every breed should be somewhat expanded: it can hardly be too much so in the racer, the hunter, the roadster, and the coach-horse, for this animal breathes only through the nostril, and it would be dangerously distressed, when much speed is required of him, if the nostril could not dilate to admit and to return the air. The neck should be long rather than short. It then enables the animal to graze with more ease, and to throw his weight more forward whether he is in harness or galloping at the top of his speed. It should be muscular at its base, and gradually become fine as it approaches the head. The withers should be somewhat high in every horse, except perhaps that of heavy draught, and it does not harm him, for there is larger surface for the attachment of the muscles of the back, and they act at greater mechanical advantage. A slanting direction of the shoulder gives also much mechanical advantage, as well as an easy and pleasant action, and a greater degree of safety. It must not however exist in any considerable degree in the horse of draught, and particularly of heavy draught. The chest must be capacious, for it contains the heart and the lungs, the organs on which the speed and endurance of the horse depend. Capacity of chest is indispensable in every horse, but the form of the chest admits of variation. In the waggon-horse the circular chest may be admitted, because he seldom goes at any great speed, and there is comparatively little variation in the quantity of air required; but in other horses the variation is often fearful. The quantity of air expended in a gallop is many times that required in hard work. Here we must have depth of chest, not only as giving more room for the insertion of the muscles, on the action of which the expansion of the chest depends, but a conformation of the chest which admits of that expansion. That which is somewhat straight may be easily bent into a circle when greater capacity is required; that which is already circular admits of no expansion. A few words more contain almost all that is necessary to be added on the conformation of the horse:—'The loins should be broad, the quarters long, the thighs muscular, and the hocks well bent and well under the horse.'

Diseases of Horses.—In the medical and surgical treatment of the horse a knowledge of the anatomy and physiology of the animal is absolutely essential, and forms a basis for an accurate acquaintance with the numerous diseases which befall the horse, their symptoms, prognosis, and mode of treatment; the properties of the medicines, vegetable or mineral, employed, the effects of chemical combinations, and the various doses from which certain effects result. Wounds, fractures, dislocations, ulcers, and a whole class of what are called surgical diseases requiring manual as well as medical treatment, demand a union of the surgeon and physician in the same practitioner. Do not then dabble in physic or surgery, but, as there are cases in which common sense will guide you, namely those in which promptness alone can save, act boldly; the horse will die if you do not, and can but die if you fail. It is in cases of sudden congestion of the brain, threatening apoplexy, that this promptitude is especially needed. Suppose that you are driving or riding a high-fed horse, one perhaps that has been pampered and kept for some time out of work; suddenly he stops, reels, staggers, and falls, and then plunges violently and desperately. What is to be done? Bleed instantly—if possible before the horse falls. If you have no lancet or fleam, a sharp penknife

will do. Few however could obey our injunction. Bleeding can only be learned practically. We would therefore recommend every traveller, whether on horseback or in a gig, every farmer, every man who keeps horses either for luxury or for necessity, to learn the art of bleeding, and to have a lancet ever in readiness about him.

When illness comes on and a little simple medicine fails to procure relief, call in scientific aid; the aid of the professional veterinary surgeon —not the horse-quack or the blacksmith—and you will do your duty.

In conclusion we cannot but recommend the reader to consult Mr. Youatt's work on 'The Horse,' which forms the most important section of the 'Farmer's Library.'

HORSE-CHESTNUT. [ÆSCULUS.]

HORSE-RADISH. [COCHLEARIA.]

HORSE-TAIL. [EQUISETUM.]

HORSHAM. [SUSSEX.]

HORSLEY, SAMUEL (born 1733, died 1806), a distinguished prelate of the English church, successively bishop of St. David's, Rochester, and St. Asaph. He was the son of John Horsley, who held two rectories. The bishop was educated at Westminster School, from whence he passed to Trinity Hall, Cambridge, and his father resigned to him the rectory of Newington in Surrey.

In 1767 he was elected a Fellow of the Royal Society, to which body be became the secretary in 1773. In 1776 he projected a complete and uniform edition of the philosophical works of Sir Isaac Newton. This design was not accomplished till 1784. In 1781 he had been appointed archdeacon of St. Albans; and it was a little before that date that he first appeared in the field of theological controversy. The person against whom he chiefly directed his attack was Dr. Joseph Priestley, a minister among the Presbyterian dissenters, who in a series of publications defended the doctrines of philosophical necessity, materialism, and Unitarianism. Dr. Horsley began his attack in 1778 on the question of Man's Free Agency; it was continued in a Charge delivered in 1783 to the Clergy of his Archdeaconry.

The tide of preferment now began to flow in upon him. Thurlow, who was then chancellor, presented him with a prebendal stall in the church of Gloucester. In 1788 he was made bishop of St. David's. In 1793 he was translated to Rochester, and in 1802 to St. Asaph. Bishop Horsley's 'Sermons' have been published in 1 vol. 8vo. and in 2 vols. 8vo., his 'Charges' in 1 vol. 8vo., his 'Biblical Criticism' in 4 vols. 8vo., and his 'Theological Works' in 8 vols. 8vo.

HORTA. [FAYAL.]

HORTE'NSIUS, QUINTUS, born B.C. 114, of an equestrian Roman family, had attained a great reputation as an orator when Cicero made his appearance in the Forum. From that time Cicero and Hortensius were considered as professional rivals, but they lived on friendly terms. At the beginning of his book 'De Claris Oratoribus,' Cicero pays an eloquent tribute of praise to the memory of Hortensius, who was then lately dead. Hortensius was successively quæstor, ædile, prætor, and lastly consul, with Q. Cæcilius Metellus Creticus, B.C. 69. He acquired great wealth, which he spent liberally, and yet bequeathed an ample inheritance to his children. Hortensius died B.C. 50. Cicero ('Brutus,' c. 92, 95) has given his opinion of the character of Hortensius as an orator.

HORTICULTURE. [GARDEN.]

HOSEA, one of the twelve minor Hebrew prophets. We possess no particulars respecting the place of his birth, or his history; but we learn from the inscription of the book that he was the son of Beeri, and that he lived 'in the days of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah, and in the days of Jeroboam the son of Joash, king of Israel.' It is therefore probable that the prophecies of Hosea extended over a period of about 60 years (B.C. 784—724), and that he was contemporary with Isaiah, Micah, and Amos.

The canonical authority of the prophecies of Hosea has never been disputed. They are frequently quoted in the New Testament; compare Hos. vi. 6, with Matt. ix. 13, xii. 7; Hos. x. 8, with Luke xxiii. 30; Hos. xi. 1, with Matt. ii. 15; Hos. i. 10, ii. 23, with Rom. ix. 25, 26, and 1 Peter ii. 10; Hos. xiv. 2, with Hebr. xiii. 15.

HOSIERY. The principal seat of the hosiery manufacture in England is in the three midland counties of Leicester, Nottingham, and Derby. In the first of these, woollen hosiery forms the principal branch of the manufacture, while in Nottinghamshire the material chiefly used is cotton, and in Derbyshire silk goods are mostly made.

The stocking-frame, by means of which this manufacture is carried on, is, next to the common warp and weft loom, the oldest machine in existence applicable to textile fabrics. It was invented about the close of the 16th century by the Rev. William Lea, of St. John's College, Cambridge, but a considerable time elapsed before the produce of this frame took the place of the trunk-hose then worn by all who could afford such an article of dress. For this reason Mr. Lea settled at Rouen, in Normandy, where his manufacture was carried on under the patronage of Henry IV.; but the assassination of the king and the political troubles brought on by that event caused the abandonment of Mr. Lea's establishment, and that gentleman shortly after died in a state of poverty at Paris.

From the time of its first invention the stocking-frame has not received any considerable improvement in respect to its principle; but the details have been improved by a long series of patented inventions. Automatic processes and steam-power have been but slenderly applied to this manufacture.

The principal seat of the cotton hosiery manufacture abroad is at Chemnitz, in Saxony, where owing to the low rate of wages, goods are made with yarns imported from Lancashire, at prices which have excluded English goods from many foreign markets.

The exports of hosiery, from the cause just named, do not increase in a ratio equal to the

of most other descriptions of textile manufactures. In the custom-house duties, hosiery is included with 'lace' and 'small wares.' These entries in 1846, in respect to cotton, amounted in declared value to 1,016,146*l.*; and in respect to worsted to 242,340*l.*

HOSPITAL (of which the word *spital* is a contracted form), a place endowed for the reception of the sick or support of infirm persons. Hospitals intended merely for the relief of poor and indigent persons in England are called *Alms-Houses*. At an earlier date hospital signified a place of shelter or entertainment for travellers upon the road, more especially for pilgrims. Many of the charitable endowments in England are called hospitals, and are incorporated bodies. As to the management of their revenues and their general superintendence, hospitals are on the same legal footing as other charities.

HOSPITALLERS. [MALTA, KNIGHTS OF.]

HOT-BED, a name given by gardeners to a heap of fresh stable litter in a state of fermentation, upon which a glazed box is placed for the cultivation of certain plants requiring heat and moisture in greater quantity than those agents exist in the external air. Formerly hot-beds were more exclusively used for various purposes in horticulture than they now are. This is owing to the perfection to which other means of producing and applying artificial heat have now attained; but still, for the growth of cucumbers and melons, raising seeds of tender annuals, and of other plants, either culinary or ornamental, hot-beds continue to be advantageously employed, as they likewise are for the striking of cuttings.

Hot-beds may be formed of various substances, such as unrotten dung, tan, leaves, or a mixture of these with moist litter; in short, any substance capable of producing and retaining fermentation, and which will admit of being built up so as to support a frame with sashes. The substance however that is most generally used is fresh stable-dung. The preparation which it requires consists in its being thrown in a heap, and also watered, if it contains much dry litter; and, as fermentation proceeds, it should be turned two or three times, and mixed thoroughly in the process.

The situation in which hot-beds ought to be formed should be dry, open to the south, and well sheltered in every other direction, either by walls backed by high and close-growing trees, or by very close and lofty hedges. Such extensive shelter, though desirable, cannot always be obtained; but some mode should be employed to break the force of sweeping winds. The basis on which the bed is to be formed should be marked out from 4 to 6 inches each way beyond the dimensions of the frame intended to be placed upon it; and, if faggots or a layer of brushwood be laid as a foundation, it will admit heat completely under in case a diminution of heat in the bed requires the application of a *lining*, which is a quantity of fresh materials added to the outside. The bed is then built of successive layers of the prepared materials, each layer being beaten tolerably compact with the fork as it is laid on, to the height of 4 feet in front, and 4 feet 9 inches at the back: the sides and ends should be quite perpendicular. The top layer should be as free from litter as possible. When thus finished, the frame and lights are placed upon it, and, as soon as the violence of the fermentation has diminished, mould is put in; and when the latter has acquired a proper temperature the plants are introduced. Instead of mould, rotten tan, or leaf mould, or sand, is spread over the surface of the bed, when pots containing seeds or cuttings are to be plunged.

As soon as the heat of the bed begins to decline, a *lining* of fresh materials must be applied. This however may be composed of substances that have not undergone any previous fermentation, and may consist of fresh stable-dung, merely shaken up as it is placed against the sides of the bed, or of grass mowings, or of leaves, or of a mixture of such substances.

HOTCHPOT. The word has been thus quaintly explained by Littleton:—'It seemeth that this word hotchpot is in English a pudding, for in a pudding is not commonly put one thing alone, but one thing with other things together.' It was a rule of the common law, that where a daughter, to whom lands had been given in frank marriage, claimed a portion of the lands descending upon her together with her sisters from the father in fee simple, she should not take any share unless she mixed and blended the lands given to her in frank marriage with the descended estate, so that they might be equally divided among all the daughters. The Statute 22 and 23 Chas. II. c. 10, s. 5 (the Statute of Distribution) provides that, in making distribution of the personal estate of intestates, advancements made by them in their lives to their children shall be brought into hotchpot. (Co.-Litt. 176-177.)

HOT-HOUSE, in Horticulture, is a structure in which exotic plants are cultivated under circumstances approximating as closely as possible to those under which they naturally exist; or it is used for accelerating the production of flowers and fruits of either indigenous or exotic plants. Hot-houses appropriated to the latter purposes are very frequently termed *forcing-houses*.

The principles by which the construction of hot-houses must be governed have reference to the three great agents in vegetation—*heat*, *moisture*, and *light*.

With regard to *heat*, the building must provide for a sufficient amount to raise the internal temperature of the house, from that of the lowest degree of external air that occurs in this climate, to that of the highest which prevails for any length of time in the countries of which the plants intended to be introduced are natives.

Moisture is of very great importance, and a due proportion of it is frequently more difficult to maintain in the atmosphere of the house than heat, and more so by some modes of heating than by others. It therefore follows that, as all applications of fire-heat have a tendency to produce too great a degree of dryness, that mode is the best for the growth of plants which allows the greatest quantity of vapour to remain uncondensed in the atmosphere of the house.

Some tribes of exotic plants, natives of the torrid zone, are adapted for existing under a very dry atmosphere. Instead of developing a thin expanded foliage, they form thick succulent masses, which no degree of atmospheric dryness seems to injure. Plants of such a nature of course require a *dry stove*. In tropical countries the air is saturated with moisture during the night, or at least it is but very rarely otherwise in the open air. But, if due precautions be not taken, and temperature only is attended to, without regard to moisture, a degree of dryness will prevail at night in hot-houses, which is double that of the tropic during the day. Artificial heat having therefore this excessive desiccating tendency, the necessity becomes obvious of adopting such modes of construction and heating as will afford the best means not only of supplying but of maintaining moisture; for vapour may be raised till the air of the house is at the point of saturation, and yet causes may operate so as to occasion a speedy condensation and a consequent dryness.

Light cannot be admitted too freely into hot-houses. This will appear evident from the circumstance of the most transparent medium that can be used reflecting a great proportion of the sun's rays when they impinge obliquely on its surface.

Although the necessity of admitting as much light as possible is now generally acknowledged, and although in cloudy weather great advantage will be derived from a roof rendered as transparent as possible, yet the generality of tropical plants do not thrive in bright sunny weather when placed near the glass of a hot-house in this climate; and the necessity of a screen of netting will appear obvious from the effects of solar radiation observed in the tropics as compared with, what is rather surprising, the still greater energy of the same in this country. Late researches upon the nature of light have also shown that the various colours of the rays of light affect plants differently, hence the necessity of avoiding coloured glasses of some kinds. A light green colour is found to admit those rays which are most favourable to vegetation in its various stages, and this is the colour adopted for the Palm Houses at the Royal Gardens at Kew.

With regard to the means of supplying artificial heat, the old system of using brick flues is now rapidly being superseded by that of hot water. Hot-water pipes, once fitted up, require no repairs for many years; whereas the brick flues must be frequently broken up in order to clear out the soot. By hot water the distribution of heat can also be better regulated, and the uniformity of temperature better maintained than by any other known means. The methods of heating by hot water are various.

With regard to a supply of moisture, the hot-water system, in which the pipes are level, or nearly so, presents several advantages over other methods of heating.

Various modes of ventilation are in use. It should be so contrived as to be sufficiently effective in preventing excess of heat; but at the same it should be perfectly at command, so that it may be employed when requisite in the most limited

degree. No method should be finally adopted until it is put to the test by trying whether, under any agitation of the external air, a candle will burn steadily inside if placed near the apertures by which the air is admitted.

In all forcing-houses tanks should be placed for supplying water of a temperature more suitable to the nature of the vegetation than that from a pump out of doors. Nothing can be more injurious than cold water applied to the roots and tops of tropical plants, or others in a forcing state, under a high temperature. The rain and dews which supply the plants of warm climates cannot be much below the mean temperature of the climate; and, if only equal to the minimum, still it would be between 20° and 30° above that of spring-water in Britain.

Hot-houses may be classed under four different heads, namely, the *dry stove*, the *damp stove*, the *bark stove*, and the *forcing-house*.

The *Dry Stove*, as the name implies, is used for the cultivation of plants which do not require much water: such as the different species of Cacti, some Euphorbias, and other succulents of like habits. The temperature of such a house during the winter months should never exceed 55° of Fahr. No water should ever be given at that period, unless the plant shows signs of suffering from want of it. In spring, or early in summer, most of the plants will show an inclination for growth, and then they may be watered about twice a week. During summer fires may be discontinued, and plenty of air given in fine weather.

The *Damp Stove* requires treatment of an opposite description. Instead of being kept dry like the last, its atmosphere should be always excessively humid, except in the winter season, when the sky is generally cloudy, and the sun's rays weak. Various methods are adopted to keep the atmosphere in this saturated state. When the house is heated with common smoke flues, the most simple way is to throw water frequently upon them, and also upon the passages and other places, from which it will evaporate, and surround the plants with a moist atmosphere. Another thing to be attended to in the treatment of this stove is the placing of the plants. They must be regularly looked over, tied up, and kept clear of each other; elevating some, depressing others, and giving the whole not only enough of room but also a natural appearance. The temperature should be, in winter, 55° or 60° of Fahr.; in spring it may then be gradually raised to 70°; and during fine weather, in the middle of summer, fires may be discontinued for about three months; but the thermometer should never be allowed to sink lower than 60°.

The *Bark-Stove*, when it is of large dimensions, consists of a pit in the middle of the house, surrounded by a brick wall, leaving as much room round the sides as will form a passage to walk in. The pit is filled with bark (commonly called tan, from its having been used previously by the tanners), and, after being allowed to sink a little and ferment, the pots containing the plants are plunged more or less deep as prudence may suggest. A bark bed is found useful in the cultivation of all

those kinds of plants which are grown in the damp stove; orchidaceous plants, for example, succeed admirably in this way. The treatment of it, so far as the temperature, watering, and syringing are concerned, is precisely the same as for the damp stove.

What are called *Palm-Houses*, *Musa-Houses*, *Orchidaceous Houses*, &c., are merely damp stoves of different dimensions, for the cultivation of those different subjects.

The only other hot-house distinct from those already noticed is the forcing-house. [Forcing.]

Hot-house plants are peculiarly liable to the attacks of insects. The most common kinds are the Green-Fly, Thrips, Red-Spider, Brown-Scale, and Mealy-Bug. The first of these is easily conquered by fumigating the house with tobacco, or syringing the plants with an infusion of the same substance. The best remedy for the thrips and red-spider is to syringe well, and keep the house very moist and warm, as those insects cannot live in excessive moisture; a little of the flowers of sulphur shaken upon the leaves will also destroy them. The brown-scale and mealy-bug are the worst of all that infest plants in hot-houses. Bruised laurel leaves strewed upon the passages and other parts of the house are said to destroy them, but these must be used with great caution, as they may not only kill the insects but the plants themselves. Various other substances are said to destroy them, but, after all, the best and surest remedy is to wash them off. This is perhaps rather difficult where these little intruders are numerous, but, after the plants are once clean, it is an easy matter, with a little attention and diligence, to keep them so.

HOTMAN, FRANÇOIS, called also by his Latinised name HOTOMANUS, was born at Paris in 1524, of a family originally from Silesia. He studied law in the university of Orléans, and afterwards practised at the bar. About 1547, when he embraced the Reformed religion, his father refused him his support, and Hotman repaired to Switzerland, where he taught humanities in the college of Lausanne. In 1550 he was appointed professor of law at Strasburg. He afterwards became professor of law at Valence, and then at Bourges, from which last place he ran away after having concealed himself during the massacre of St. Barthélémi, and repaired to Geneva, and then to Basel, where he died in 1590. His works, in 3 vols. fol., were published in Geneva in 1599.

HOTTENTOTS. [Africa; Cape of Good Hope.]

HOTTINGER, JOHANN HEINRICH, was born at Zürich, March 10, 1620. After studying in his native country, he repaired to Leyden in 1639, where Golius the Orientalist engaged him as his assistant. Hottinger made his Oriental studies subservient to his principal object, that of illustrating the Hebrew text of the Bible. He was appointed Professor of Scriptural Theology at Zürich, and in 1655 the Elector Palatine induced him to come to Heidelberg, to fill the chair of Oriental languages. He was afterwards made rector of that university. In 1667 the university of Leyden offered him the chair of theology, which he accepted; but while on the point of repairing to his destination he was drowned by the upsetting of a boat in the river Limmat. Hottinger left numerous works, chiefly on Oriental learning, the principal of which are:—'Thesaurus Philologicus, seu Clavis Scripturæ,' Zürich, 1644; 'Historia Orientalis,' 'Etymologicum Orientale,' Frankfort, 1661; 'Historia Ecclesiastica Novi Testamenti,' 9 vols. 8vo., 1667.

HOTTO'NIA, a genus of plants belonging to the natural order *Primulaceæ*. It is a native of Great Britain in ponds and ditches, and is called the Water-Violet. The leaves are submerged and crowded; the flowers rising above the water are of a purple and yellow colour. It is a pretty plant, but possesses no useful properties.

HOT-WALL. Hot-walls, or walls with flues in them, are constructed in cold countries, in order to afford warmth to trees placed against them, so as to counteract the effects of frost in autumn, when the wood and buds are maturing, and in spring, when the blossoms and leaves are unfolding. If hot-walls are used for these purposes only, they are productive of great benefit to the plants which they shelter; but if, as often happens, in addition to this it is attempted by their aid to advance the ripening of fruit in any considerable degree, hot-walls are of very doubtful service.

One furnace is allowed for heating about 40 feet of wall, that is, 20 feet on each side of the place where the fire is situated. The flues on either side are made to take four courses, or two returns; the first course being a little above the surface of the ground, and the upper $1\frac{1}{2}$ or 2 feet below the coping.

Instead of flues, hot-water pipes might be introduced into the cavity of a common hollow wall, a little above the level of the border.

HOUBIGANT, CHARLES FRANÇOIS, a priest of the Oratory, and an eminent Biblical scholar, was born at Paris in 1686. His devotion to study produced a serious illness, which terminated in total deafness. Being thus incapacited for public duty, he directed his principal attention to the study of Hebrew, in which he followed the system of Masclef, who was a strenuous opponent of vowel points. In 1732 Houbigant published his 'Racines Hébraïques,' and, in 1746, his 'Prolegomena' to a new edition of the Hebrew Bible. His great work, entitled 'Biblia Hebraica cum Notis Criticis et Versione Latina ad Notas Criticas facta,' appeared at Paris in 1753, in 4 vols. fol. Houbigant died October 31, 1783, in the 97th year of his age.

HOUBRAKEN, the name of two Dutch artists, father and son:—

Arnold Houbraken, the father, was born of a good family at Dort in 1660, and was the pupil of Samuel van Hoogstraten. He painted history and portraits, and executed many designs for booksellers. He lived chiefly at Amsterdam. Houbraken is best known by his account of the lives of Dutch painters, with portraits engraved by his son, in continuation of Van Mander—'Groote Schouburg der Nederlantsche Konstschilders en

Skilderessen,' in three parts, published in 1718, 1719, and 1721. Houbraken died in 1719.

Jacob Houbraken was an admirable engraver. He was born at Dort in 1698. The most beautiful specimens of Houbraken's engravings are some of 'The Heads of Illustrious Persons of Great Britain,' published in London by the Knaptons in 1748. He died in 1780.

HOUGUE. [MANCHE.]

HOUND (German, *Hund*), a term generally applied to dogs of chase, and most strictly to those which follow their quarry by the sense of smell. Nevertheless, it is popularly applied to such as hunt down game by sight, as the Scottish Deerhound, and the Greyhound, or Gazehound. [BEAGLE; BLOODHOUND; GREYHOUND; HARRIER.] Our ancient breeds of hounds have merged into lighter and swifter races. Of these the Foxhound takes the pre-eminence in speed, vigour, and endurance.

HOUR, HOUR-CIRCLE, HOUR-LINE. The first word always means the twenty-fourth part of a day, by what revolution soever the day may be measured. In angular measure, it signifies the twenty-fourth part of a complete revolution, or 15°.

Any great circle on the sphere which passes through the two poles is called an hour-circle, because the hour of the day is known when that circle of the kind mentioned is ascertained upon which the sun is for the time being. But the two semicircles into which the poles divide such a circle belong to different hours, and are twelve hours asunder. In fact, it is a *semi*circle which is spoken of under the term hour-circle.

The hour-lines of a dial are the lines on which the shadow falls at different hours, and are the intersections of the hour-circles with the plane of the dial. In the times preceding the common use of clocks, the science of dialling was of considerable importance, and many works were written on the subject, in which the forms of such instruments were varied without end, and also the methods of constructing them. One work even announces 'a new conceit of reflecting the sunnie beames upon a diall, contrived on a plane which the direct beames can never shine upon.'

HOUSE. The degree of comfort exhibited in the arrangement of their houses is one and a very important characteristic of a nation's degree of civilisation; and we may mark the progress of this civilisation in its successive stages from a rude condition to a high state of perfection by studying the architecture of a people as shown in their ordinary dwellings.

There is a model in the British Museum representing most probably a part of an Egyptian house. It appears, to judge from the figures, to be about 10 or 12 feet square, and 14 or 15 feet high. It is called a granary. In the lower part of this model, which has two stories, there is a court, the angles of the walls of which are raised a little higher in a sweep. The door into the court is low and roughly constructed, the hinges being merely wooden pins let into a socket above and below. The stairs leading to the upper part appear to be formed of a solid beam placed aslant, and the steps notched out. The walls are plastered. The roof appears to have been flat. There are three clamped and partly framed square-shaped doors to the mouths of the granaries.

In No. 68 of Rossellini's work ('I Monumenti del' Egitto e della Nubia') is a section representing an Egyptian house. The doorway is similar in form to the doorway of an ancient Egyptian temple; above are folding windows; a staircase leads up to the floor where the windows appear, and above them is an open gallery supported on columns; the garden, in a court, is shown attached to the house. The best description of a modern Egyptian house is given by Lane in his 'Modern Egyptians.'

Vitruvius (vi. 10) gives a general description of a Greek house, which differed from the Roman in not having a vestibule and atrium; and the Greek practice of separating the apartments of the females from those of the males led to an entirely different internal arrangement.

It appears, from the oration of Demosthenes against Aristocrates (c. 53), that the houses of many of the Athenians were in his time very magnificent, while in the time of Themistocles and Miltiades they were comparatively mean; and indeed it may be inferred, from various passages in the orators and other writers, that a great many of the Athenian houses continued to be very small and inconvenient. A Greek traveller, who visited Athens about B.C. 200, says that most of the houses were mean, and only a few good.

The modern Greek house is of a quadrangular form, with a court in the interior; the staircases are placed on the external part of the house, leading to a gallery round the first floor. The entrance is in the centre of the quadrangle; over the entrance is the sitting apartment of the women; a bow-window is placed in this apartment over the door. In the lower story the cattle are often placed. The women's apartments are separated from the men's, as was the custom among the ancient Greeks. Many Greek houses are exceedingly mean and ill-furnished.

The most perfect remains of Roman houses are at Pompeii. Those called the house of Pansa and the house of Sallust are especially remarkable for their size and grandeur. The Pompeian ruins exhibit the dwellings of both the rich and the poor; the latter are small and meanly finished; the former are in comparison extensive, and often richly decorated with columns, paintings, and mosaics. The principal features of a Roman house are the atrium, the tablinum, and the peristyle. The *atrium* is a kind of central quadrangular hall or court, having in the middle an *impluvium* or tank to catch the rain-water which falls through an opening in the roof or ceiling. The *tablinum* is a kind of passage, paved with mosaic, which leads from the atrium to the *peristyle*. This peristyle is a second and larger quadrangle, supported by pillars, and having a basin or fountain in the centre. On all sides of these quadrangles are the various domestic apartments.

The walls of Roman houses were decorated with arabesque paintings, which added an agreeable charm to the light and airy apartments of a hot climate.

Three centuries ago English houses were constructed in a very different manner from the houses of the present century. The chief materials were wood and plaster, and a common but peculiar feature was the projecting upper floors. The internal arrangement was adapted to the wants of that day, and the external architecture had often a picturesque appearance. The Butter-Market at Ipswich contains a remarkable specimen of a house of this period. After the great fire of London the advantage of building in cities with brick or stone became so apparent, as well as the adoption of some regularity, that a great change took place in house-building in the metropolis, which extended by degrees to the houses which were from time to time rebuilt throughout the country. In this gradual change have almost entirely disappeared the projecting floors with large bow-windows, the wooden galleries round the quadrangular courts, the boldly projecting dripping eaves, and the high-pitched roofs with their large windows. In the latter part of the last century an act of parliament was passed for the improvement of house-building in the metropolis, as far as regarded strength, protection from fire, and the gradual removal of the old-fashioned projections. This system has no doubt gradually led to improvements in house-building all through England.

The modern English house, which is most commonly of brick, varies in its arrangement according to the wealth of the occupier, or the skill and taste of the architect. The houses of the middle class, especially in cities, are nearly the same in their chief features.

In cities, and particularly in London, for want of space, the basement story is for the most part built below the level of the ground, the earth being excavated for that purpose. This floor usually contains the kitchen and the rooms for the use of the domestics. The ground-floor, or the floor on a level with the ground, is laid out in the following manner :—the entrance is mostly at the side, leading into a passage, at the end of which is the staircase, which in double flights, with landings between each, ascends to the top story. On one side of the passage-way is usually placed the dining-room, and the drawing-room is placed on the first floor above the ground-floor. On the other floors are arranged the bed-rooms : the highest floor is called the attic. In the houses of the wealthy the drawing-room is formed of a suite of rooms, and the apartments are much more numerous. The servants' rooms are often placed in a contiguous wing of the house, near enough to be within immediate call, and yet so separated from the house as not to interfere with the privacy of the family. The best arranged English houses are the country mansions of the rich.

English houses are in general well provided with means for carrying off water and all impurities which require to be removed from the premises. The large towns of England which have sprung up or greatly increased within the present century, and particularly London, contain numerous capacious sewers, with which the private houses communicate, and thus are kept in a state of cleanliness and propriety which no other houses in any country enjoy in an equal degree. The convenient arrangement of bells is also one of the striking features in an English house, and is nowhere so general as in England.

The floors of English houses are constructed of wood, and boarded ; and the roofs which are pitched, or at an angle, are covered with slates or tiles. The rooms are heated with open grates, with flues over them, the exit for which is above the roof. There is no part of an English house in which the skill of carpentry is more called for than in the construction of the flooring, owing to the various modes of construction adopted, and the relation which the floor bears, in respect to strength, to the walls, partitions, and ceilings.

The chimney-flue is a very important feature of an English house, as upon its construction depends the comfort of having the apartment free from smoke.

The staircase of an English house is usually constructed of wood, with a protecting baluster, often elegantly formed, on one side.

Every convenience which ingenuity can contrive is now found in the numerous minute arrangements and details of English houses, even of those which do not belong to the wealthy class. Those luxuries which the richest nobles could not formerly procure at any price are now at the command of every man of a moderate income. The windows are hung with pulleys and weights, so that they are opened and shut with the greatest ease. The shutters which close them at night are made to fold and to fall into the smallest possible compass. The ceilings and walls are beautifully plastered, and the latter, if not painted, are carefully covered with paper printed of various colours ; and the wood-work is often painted in imitation of the most costly materials.

The houses of the poorer classes are too often negligently constructed. In their construction, economy, convenience, and a wholesome ventilation, should be mainly kept in view, and these may be united with as much picturesque beauty as the nature of the materials will admit of without increasing the expense. In cottages of two stories the upper should be warmed by a flue from the fire in the lower ; in order to effect this, the vent ought to be carried up the middle with its sides as thin as possible. In a single cottage of 12 or 14 feet square, the conveniences should consist of a common dwelling room on the ground floor, and a sleeping apartment on the upper floor, which should be partitioned off to separate the sexes.

The English and Scotch cottages differ in their external appearance and arrangement. The walls of the old English cottage were formed of clay, mud, or turf, kept together and strengthened with upright pieces of wood and with wooden braces ; the roof was steeply pitched. In order to keep the walls dry, the eaves of the roof were continued downwards beyond the top of the wall and projected from it. The chimneys, which formed the main strength of the building, were generally carried up singly in one or both ends of the building, and for the most part they projected on the outside of the wall. The roof was covered

with straw, reeds, or slate. An upper chamber was sometimes formed in the roof, lighted by a dormer window in the side of the roof, or a window was formed in the gable wall. The front walls being low, the windows were made much longer than high, and the long lintel, or head part of the window, was supported by one or more upright pieces called *munnions*, or *mullions*. The frames for the glass revolved on hinges with an upright axis, and were glazed in borders of lead stiffened by cross pieces of wood or iron, called saddle-bars. A small shed for a cow was frequently added. It is most probable that cottages were constructed originally of but one story; and in such cases the projecting roof would well protect the walls from wet; but, when a second story was raised, the windows and doors were more exposed to the rain; to protect the heads of the doors and windows, a projecting piece of wood or slate was placed over them, and in some cottages the second floor was projected over the lower or ground floor. The best English cottages of recent construction are built of brick and covered with slate. The use of these materials has changed the character of this class of dwellings. In many cottages the chimney-stack forms the principal bearing of the floors and roof.

The Scotch cottage has not only a different appearance when compared with the English, but, from its being so much wider, it admits of two apartments being formed on the ground floor; this is also a matter of necessity, as they are seldom raised more than one story. The material for the walls is most commonly stone; the roof is large and heavy in appearance, and has but a small projection beyond the walls; the gable walls also run up frequently above the roof, forming a parapet, which is sometimes notched so as to resemble steps, or has a battlement appearance. The windows and doors, being without the projecting label, are not so well protected from the rain; the walls however are thick, and the window openings, on account of the size of the stones, are narrow; the windows slide vertically, being placed in a frame. The squares of glass employed are larger than those used in English cottages, in order to obtain more light; the sides of the windows are also splayed. The chimneys are either carried up in one or both gables, or in a partition wall, which separates the two apartments in the length. In some cases the chimney is placed in the front wall, with a large recess all round the fire, which gave great advantage, in admitting more than double the number of persons which the modern construction admits of. The old roofs of thatch, turf, or heath, have given place to slate and tile. The common kind of cottages in the north are constructed so as to receive a framed bedstead and press, or to form recesses, by means of a partition, for the reception of the bed and cupboard on the side of the apartment opposed to the window.

As the French and Italians of the middle classes do not generally live in separate houses like the English, but on floors containing a series of rooms, it follows that the arrangement of their houses differs from that of the English. The staircase, as in public chambers, is common to each floor. The rooms communicate with each other, and generally with a passage or balcony on one side: chimneys are rare, stoves being most commonly used to heat the rooms. The windows are not hung with pulleys and weights, but are formed of two folding glass doors on hinges. The Mezzanino (Mezzanine) is common in French and Italian houses. The houses have generally projecting roofs with often broad overhanging eaves, while in England the gutter is usually concealed within a parapet wall. French and Italian houses are mostly built of rough stone and stuccoed; the floors are seldom boarded, being paved with glazed tiles or unglazed bricks.

The Spanish houses are very spacious; they have large courts in the interior, and are formed with galleries round the inside of the quadrangular courts: families occupy the separate floors, as in France and Italy. The chief door, which is large, has a small wicket, from which any one applying for admission is first scrutinised.

The houses in many parts of Germany approach nearer to the English in their arrangement than the French and Italian houses. In many places the houses are a framework of wood, and the interstices are filled with unbaked bricks, and are plastered with clay. The mode of heating houses in Germany and Switzerland is principally by stoves (ofen), which, in the better houses, are so arranged that the domestic feeds the fire without entering the apartment which is heated by it.

The city architecture of Russian houses, both in its effect and arrangement, resembles the architecture of Italian and French houses, except that the roofs are covered with sheet-iron painted with vivid colours, mostly green and red. The windows are double.

For the external design of modern house architecture the English are principally indebted to the Italians. This style, which was invented by the great Italian architects and executed in many of the Italian cities, is mainly characterised by the judicious arrangement, proportion, and decoration of the openings in the elevations, the windows and the doors, and by the bold cornices which surmount the whole front. These masterpieces are deservedly studied by the modern architects, and their principal features sometimes judiciously introduced into their designs. The cities of Rome, Genoa, Verona, Venice, and Bologna, with many others, contain magnificent examples of palatial architecture, a style which might be advantageously employed in this country to a greater extent than it has been.

Houses are generally ventilated by means of the openings, the doors and windows, and the chimneys. The system of ventilation adopted in some large covered markets, as at Liverpool, and some large hospitals, might be adopted with advantage in certain classes of dwellings, as in workhouses and other buildings of that class. The system consists in the adoption of fine air-holes on the line of the floors, which keep up a gradual fresh current of air, without a rapid draught.

The houses of all countries are, in some degree at least, adapted to the climate. The houses

hot climates are large, with lofty and well-ventilated apartments; while those of cold climates are more particularly arranged with a view to protect the inhabitants from cold.

Various details relating to the practical construction of houses are given under BRICKWORK; BUILDING; CARPENTRY; FOUNDATION; FIREPROOF BUILDINGS; and other similar heads.

HOUSEBREAKING and BURGLARY. The derivation of the word burglary is uncertain. The offence of burglary at common law is defined to be 'a breaking and entering the dwelling house of another in the night, with intent to commit some felony within the same, whether such felonious intent be executed or not.' By 1 Vict. c. 86. 'night-time' is declared to be from nine o'clock in the evening till six o'clock the next morning. By dwelling-house is meant the actual and personal residence of a man. If a dwelling-house is feloniously entered at any other time than in the night-time, the offence is simply house-breaking. Burglary is now only punishable with death when violence is used: in other cases the punishment is transportation for life or for not less than ten years, or imprisonment for a term not exceeding three years.

HOUSE-LEEK. [SEMPERVIVUM.]

HOUSSA. [SOUDAN.]

HOVEDEN, ROGER DE, an English historian, is supposed to have received his name from Hoveden, or Howden, in Yorkshire, the place of his birth. He was in the household of Henry II., probably as a chaplain. The exact times of Hoveden's birth and death are unknown. His 'History' commences in 731, where Bede ends, and continues to 1202, the third year of King John. It was published by Sir Henry Savile, in the 'Scriptores post Bedam,' fol., Lond., 1595.

HOWARD, HENRY, EARL OF SURREY, son of Thomas Howard, third duke of Norfolk, was born about the year 1516, and was educated at Christ Church, Oxford. In 1540 he distinguished himself at a tournament held before the court at Westminster, and was soon afterwards created a knight of the garter. In 1542 he served under his father in the army sent against Scotland, and in 1544 accompanied the troops with which the king invaded France. On the surrender of Boulogne in 1546, he was made captain-general and commander of the garrison left for its defence; but in this situation he was superseded by the Earl of Hertford, and on his return to England dropped some remarks against the king and council which were reported by his enemies, and led to his ruin. He was accused, on some frivolous grounds, of high treason, was committed to the Tower of London, tried, and found guilty, and on the 19th of January, 1547, was beheaded on Tower Hill.

Surrey's works are principally remarkable as forming an important æra in English literature. He far surpassed in smoothness of versification all the poets who had preceded him except Chaucer, as well as all his contemporaries. His sonnets have much delicacy and tenderness, and he was the first to introduce blank verse, in a translation of the 2nd and 4th books of Virgil's 'Æneid.'

HOWARD, CHARLES, son of William, Lord Howard of Effingham, and grandson of Thomas, second duke of Norfolk, was born in 1536. He succeeded to his father's title in 1573. After seeing much service by land and sea, he was appointed in 1585 lord-high-admiral of England, and had the management of the naval preparations made against the Spanish Armada in 1588. He acquitted himself of this most weighty charge with signal prudence, skill, and bravery. In 1596 he was joined with Essex in the expedition against Cadiz. For this service Lord Howard was created earl of Nottingham. In 1599 he suppressed the ill-concerted rebellion of the Earl of Essex, whom he took into custody. Under the reign of James I. he was employed in several distinguished capacities. He died at the advanced age of 87, Dec. 14, 1624.

HOWARD, JOHN, was born about 1727. His father was a London tradesman, who, dying early, left him in possession of a handsome fortune. In 1756, in a voyage to Lisbon, which he was desirous of seeing immediately after the great earthquake, he was captured by a French privateer. The sufferings which he endured and witnessed during his confinement struck deep into his mind. The impression was renewed in 1773, when, as sheriff of Bedfordshire, he had charge of the prisons of the county. In that year he visited, in two journeys, most of the gaols of England, and accumulated a large mass of information, which in March 1774 he laid before the House of Commons. Once actively engaged, he became more and more devoted to this benevolent pursuit, and made many jouneys at home and abroad in order to collect information. The first fruit of these labours was a 4to. volume, entitled 'The State of the Prisons in England and Wales, with some preliminary observations, and an account of some Foreign Prisons,' 1777.

The House of Commons seconded his views by the introduction of a bill for the establishment of houses of correction. Mr. Howard, in 1778 and 1779, made other journeys on the Continent and in Great Britain. The results were published in 1780, in an 'Appendix to the State of the Prisons in England and Wales,' &c. In 1781 and several succeeding years Mr. Howard continued his tours on the Continent, and visited most of the countries of Europe.

He returned to England in 1787, resumed his home tours, and in 1789 published the result of his late inquiries in another important volume, entitled 'An Account of the principal Lazarettos in Europe, &c., with additional Remarks on the Present State of the Prisons in Great Britain and Ireland.' The same summer he renewed his course of foreign travels, meaning to go into Turkey and the East through Russia. He had however proceeded no farther than the Crimea when a fever, which he himself believed to be infectious, put an end to his life, January 20, 1790. He was buried at Cherson.

HOWARD, HENRY, R.A., was born Jan. 31, 1769. He became the pupil of Philip Reinagle, R.A., and was admitted a student of the Royal Academy, March 27, 1788. On Dec. 10, 1790, he received at the same time the first

silver medal for the best drawing from life, and the gold medal for the best historical picture, 'Caractacus, a prisoner, recognising the dead body of his son.'

In 1791 Mr. Howard went to Rome, and there painted the 'Dream of Cain,' his first work for the academy exhibition, which was forwarded to London in 1794.

After his return to London, Mr. Howard exhibited, in 1796, among other subjects of more or less interest, 'the Planets drawing Light from the Sun,' an idea which he afterwards expanded into one of his most admired pictures, 'the Solar System.'

In 1801 Mr. Howard was elected an Associate; in 1808 a Royal Academician; and in 1811 he succeeded Mr. Richards as secretary to the Royal Academy. From the year 1796 up to 1814 he had been occupied on a variety of works: on designs for engravings illustrative of the Poets; a number of portraits of private individuals; and many pictures, classical, religious, and historical.

In 1814 Mr. Howard obtained the premium of 50 guineas for the best design for a medal for the Patriotic Fund; and after that time he was employed on designs for most of the principal medals and great seals executed in this country during the remainder of his life. In the same year Mr. Howard exhibited a picture at first called 'Sunrise,' but since better known as 'the Pleiades.' In 1818 he exhibited one of his finest works, 'Fairies on the Sea-shore.' Sir M. W. Ridley, who purchased it, gave him a commission to paint a larger picture of the 'Birth of Venus,' which was exhibited in the following year. It has been considered one of the finest works of the artist and of the class. Mr. Howard died October 5, 1847, at Bath, in the 78th year of his age.

HOWDEN. [Yorkshire.]

HOWE, RICHARD, afterwards Viscount Howe, the second son of Emanuel Scrope Howe, governor of Barbadoes, was born in 1725. At the age of fourteen he left Eton, and joined the Severn, one of the squadron which, under the command of Commodore Anson, was sent to make war upon the western coasts of Spanish America. He distinguished himself in the West Indies and on the coast of Africa, which caused his rapid promotion to the rank of captain. On the 1st of June, 1758, he hoisted his flag in the Essex as commodore of the fleet destined to blockade Brest. In the same year he married, and soon afterwards, losing his brother Viscount Howe, he succeeded to his title and estate. In 1759 Lord Howe defeated the squadron under M. de Conflans. Peace being proclaimed, Howe occupied a seat at the Board of Admiralty for two years, and then filled the important office of Treasurer of the Navy, and was returned to parliament for Dartmouth. In October 1770 he was promoted to be Rear-Admiral of the Blue, and Commander-in-chief in the Mediterranean. On a change of ministers, his friends appointed him Admiral of the Blue. Lord Keppel having resigned his office, Lord Howe succeeded him as First Lord of the Admiralty. In three months he was obliged to resign, on another change of the ministry, which restored Lord Keppel. At this time he was created Earl Howe. On the 22nd of June, 1790, he was appointed to the command of the channel fleet. On the 1st of June, 1794, an engagement took place in the Channel between the British and French fleets, when ten of the enemy's ships were dismasted, seven were taken, three only rejoined the French admiral, and Howe had the glory of towing into Portsmouth six ships of the line.

Lord Howe's health now began to fail; but, notwithstanding his infirmities, he consented to go in person to quell the mutinies that had arisen at Portsmouth, Spithead, &c. With his wife and daughter he spent the rest of his life in retirement, in the enjoyment of a fortune of about 1800*l.* a year. He had declined a pension. He died Aug. 5, 1799.

HOWELL, JAMES, the son of a clergyman, was born near Brecknock about 1596. He was educated at Jesus College, Oxford, where, in 1613, he took his bachelor's degree. His father's family was numerous, and he had to shift for himself. After filling various appointments, in 1626 he became secretary to Lord Scrope, and was next year chosen to sit in parliament for Richmond. In 1632 he went to Denmark as secretary to an extraordinary embassy. In 1640 his services were rewarded by an appointment to the clerkship of the council at Whitehall. The breaking out of the civil war rendered his office a place of danger, and, in 1643, he was committed to the Fleet, where he was detained till after the king's death. He was penniless and in debt; but he set about writing for the press, by which he contrived to maintain himself. A little flattery which he had found it convenient to administer to Cromwell was forgiven at the Restoration, when the place of historiographer royal was created as a means of providing for him. He retained this office till his death, which happened in November 1666. Howell's writings are very numerous. A few of them are in verse. His name is chiefly preserved by his letters. They are whimsically called 'Epistolæ Ho-Elianæ; Familiar Letters, domestic and foreign, partly historical, partly political, and partly philosophical.' The first volume appeared in 1645, the fourth and last in 1655.

HOWITZER, a piece of ordnance which differs from what is denominated a gun only in its proportions, the ratio of the length of the piece to its diameter being considerably less than that in the latter kind of arm. It is also similarly mounted, and is employed to project solid and hollow shot, loaded shells, carcasses, and case shot, either in the point-blank direction or at angles of elevation, which hitherto have not exceeded fifteen degrees.

The howitzer is used against troops in the field, in the attack of redoubts or villages, and both in the attack and defence of regular fortresses.

About the year 1820, Colonel Paixhans, in France, constructed what were denominated canons obusiers, for the purpose of projecting solid or hollow shot of great diameter: and in 1824 and 1836 the late General Millar, in this country, executed for the like purpose iron shell

guns, or naval howitzers, as they are called, whose calibres are 10 inches and 8 inches respectively. Besides these, 24-pounder and 12-pounder howitzers are employed in the British service.

HOWTH. [DUBLIN.]

HUBER, FRANZ, was born July 2, 1750, at Geneva. He became blind at an early age, it is said through excessive study. His attention having been directed to the habits of bees, he had bee-hives constructed of glass, and his servant Franz Burnens became his assistant in making observations on the insects. The results were published by him in 1792, 'Nouvelles Observations sur les Abeilles.' Burnens having been called away by other affairs, Huber was assisted in his inquiries by his wife and by the son of Burnens. In 1801 he published a 'Mémoire sur l'Influence de l'Air et des diverses Substances Gazeuses dans la Germination de différentes Plantes.' His latest observations were included in the second edition of his 'Nouvelles Observations sur les Abeilles,' Paris and Geneva, 2 vols, 1814. His last years were spent with his daughter at Lausanne, where he died, Dec. 21, 1831.

HUCHTENBURG, JOHAN VAN, a Dutch battle-painter, was born at Haarlem in 1646. He studied with Vandermeulen at Paris. His pictures are much in the style of Wouvverman. He lived chiefly at the Hague, but died at Amsterdam in 1733.

HUDDERSFIELD, a market-town and parliamentary borough in the West Riding of Yorkshire. The borough extends over the entire township, and includes a population of 25,068.

Huddersfield is situated 7 miles S.E. from Halifax, 26 miles N.W. from Sheffield, 189 miles N.N.W. from London. The greater part of the houses are built of a light-coloured stone. The market-place is a large area, surrounded with good houses and shops. The manufactures of Huddersfield and the adjacent villages are principally woollens. The cotton manufactures are also carried on, though not to a very great extent. In 1765 a commodious cloth-hall was erected for the buyers and sellers of the Huddersfield manufactures by Sir John Ramsden. The trade derives great advantages from its inland navigation, by means of the Ramsden and Huddersfield canals, both eastward and westward.

The parish church was a small ancient structure, which was taken down in 1835, when a new one was erected in the perpendicular Gothic style, and opened in October 1836. There are three other churches of the establishment, and there are also places of worship for Methodists, Independents, Quakers, and Roman Catholics. The sunday-schools and religious and educational societies connected with the town and county are liberally sustained. The Philosophical Hall is a Grecian building, which was completed in 1837. There are also subscription and law libraries, and a commercial news-room. The town is lighted with gas. The Huddersfield and Upper Agbrigg Infirmary is a large and elegant stone building in the Grecian Doric style. It was erected in 1830. The borough returns one member to parliament.

HUDSON, HENRY, is eminent among those early navigators who sought a shorter passage to China than the circuitous route round the Cape of Good Hope. Nothing is known of him before 1607, when he was employed by some London merchants to command a ship fitted out to prosecute that object. After three unsuccessful voyages he undertook a fourth, in hopes of discovering a north-western passage, in April 1610. In the course of June and July he sailed through the Strait, and discovered the Bay, both of which have since been called after his name. [HUDSON'S BAY.] The insufficiency of provisions exposed him and his companions to great hardship, and at last proved fatal to his scheme. The men became discontented and insubordinate, and at last, while they were in the Strait on the voyage home, some of the boldest of th mutineers seized the captain and eight of his stanchest followers, and sent them adrift in an open boat. They were never afterwards heard of.

HUDSON, JOHN, D.D., was born at Wedehop in Cumberland, about the year 1662. He took the degree of M.A. at Oxford in 1684, and was soon afterwards elected a fellow of University College, of which he was tutor for many years. In 1701 he was appointed principal librarian of the Bodleian Library; and in 1712, principal of St. Mary's Hall. He died on the 27th of November, 1719. Hudson published editions, with critical notes, of several of the classical authors.

HUDSON, THOMAS, was born in Devonshire in 1701. He came to London, and became the pupil of Richardson the painter, and married his daughter. After the death of Jervas and Richardson, Hudson was the most successful portrait-painter in London. Sir Joshua Reynolds was one of his pupils. His style was of the Kneller school. Hudson died in January 1779.

HUDSON, River. [NEW YORK.]

HUDSON'S BAY is an extensive mediterranean sea on the eastern side of North America, and connected with the Atlantic Ocean by Hudson's Strait. Its length is upwards of 1000 miles (between 51° and 66° N. lat.). It is more than 500 miles across in its widest part. The southern portion, called James's Bay, extends nearly 240 miles, and at its mouth (near 55° N. lat.), between Cape Jones, E., and Cape Henrietta Maria, W., it is 140 miles wide. The coasts are generally high, rocky, and rugged, and in many places precipitous, except along the south-western shores between Cape Henrietta Maria and Cape Churchill, where they are generally low and swampy, and frequently exhibit extensive strands. The depth of water in the middle of the bay has been taken at 150 fathoms, but it is probably greater. The northern part of Hudson's Bay is occupied by Southampton Island, which is formed of high rocky masses, and seems to consist of numerous smaller islands. It does not appear to be inhabited. Between it and the East Main is Mansfield Island, likewise a mass of rock, but not of great elevation. About 100 miles from the shores of East Main, and nearly in the meridian of Mansfield Island, there is a dangerous chain of rocks, extending as far as the innermost portion of James's Bay.

The countries which inclose Hudson's Bay on all sides constitute by far the greatest portion of the British dominions in North America; but they are not known under any one general denomination. These countries extend between 49° and 70° N. lat., and from Cape Charles in Labrador (near 55° W. long.) to the Rocky Mountains and the mouth of the Mackenzie River (135° W. long.). The area cannot be given, as considerable tracts of the coast are still unknown, but it probably does not fall much short of 3,000,000 square miles.

This immense country may be divided into four natural regions. The most eastern is the sterile region, which lies along the shores of the sea, and extends far inland. That portion of it which lies west of Hudson's Bay is called the *Barren Grounds*. The whole region is solely inhabited by Esquimaux and a few forlorn families of Indians. The winters are longer and more severe than in Greenland in the same latitude.

The second region extends on both shores of James's Bay, and along the southern shores of Hudson's Bay, as far westward as Cape Churchill. It also extends inland to the ridge which forms the northern boundary of Canada, and to the lakes Superior, Winnipeg, Deer, and Wollaston. Farther inland it is generally well wooded, and produces fur-bearing animals. This country may be called the *Wooded Region*.

To the W. of the wooded region is the *Savannah Region*, which extends to the foot of the Rocky Mountains, and northward to the Lake of Athabasca and the Peace River. Its surface stretches out in extensive plains, intersected only by the beds of several rivers, which are considerably below the plains. It supports a thick grassy sward, on which numerous herds of buffaloes and several kinds of deer find abundant pasture.

The fourth region we shall call the *Valley of the Mackenzie River*. It comprehends the country between the sterile region and the Rocky Mountains north of Lake Athabasca. The river generally runs through a bottom rarely more than a few miles wide, whose alluvial soil is in many places covered with trees. The delta of the Mackenzie, which is 90 miles in length (from 67° 40′ to 69° 10′ N. lat.), and from 15 to 40 miles in width, is formed by flat alluvial islands, which divide the various branches of the river.

The Rocky Mountains, which separate the countries now under survey from the North-Western Territory, seem to attain the greatest elevation where the sources of the Athabasca River approach the upper course of the Columbia River. Mount Browne rises to 16,000 feet above the sea.

Numerous large rivers traverse this extensive country. One of the most important is the Moose River, with its affluent the Abbitibbe. Between the mouth of the Moose River and Cape Churchill are the embouchures of the Albany, Severn, Hayes, and Nelson rivers.

The mouth of the Churchill River is W. of Cape Churchill. It rises in Methye Lake. Its winding course probably exceeds 700 miles. Great Slave Lake is the largest of the numerous lakes of this country. It extends between 109° and 117° 30′ W. long., or about 250 miles from east to west, with an average breadth of 50 miles. It covers a surface of more than 12,000 square miles.

From the N.W. corner of this lake issues the Mackenzie River, the largest in the country, which varies in breadth from one to three miles, except in a few places, where it is narrowed by rocky hills. It reaches the Arctic Ocean in 69° 10′ N. lat. At 67° 40′ N. lat. it begins to divide into several branches, which at their mouths occupy a space of more than 40 miles along the shores of the Arctic Ocean. The southern branch of the Mackenzie originates within the mountain-ranges of the Rocky Mountains. Near 60° N. lat. the Great Bear Lake River falls into the Mackenzie; it is the channel by which the Great Bear Lake discharges its water. This lake lies between 65° and 67° N. lat., and 117° 30′ and 123° W. long., and has a very irregular form; it probably covers an area of 8000 square miles. The Mackenzie River, including the Athabasca branch, traverses 15 degrees of latitude, and it is supposed that its whole course does not fall short of 2000 miles.

East of the mouth of the Mackenzie and close to the shores of the Arctic Ocean is a great lake, called Esquimaux Lake, which communicates with the sea. Besides the Mackenzie, the Copper-mine River traverses the northern part of the countries, and falls into the Arctic Ocean. Its mouth is in 67° 15′ N. lat., and between 94° and 95° W. long.

The present wealth of the country consists in its animals, especially rein-deer, musk-ox, moose-deer or elk, other kinds of deer, bears, wolves, wolverines, foxes, beavers, otters, racoons, and several smaller animals. Iron, copper, and lead are known to exist, though not yet worked to any extent; and coal has been found at various places, Vancouver's Island being one.

The native tribes consist of Esquimaux and Cree Indians. The settlements of the Hudson's Bay Company are divided into two districts; the S comprehends the settlements on the W. coast o Labrador, together with the more numerous esta blishments in the countries inclosing James's Bay and as far as the banks of the Albany Rive The principal depôt is at Moose Fort, near th mouth of Moose River. The northern distri comprehends all the others as far north as Fo Good Hope on the Mackenzie River, north of th Polar Circle. Its chief settlement is York, on th Hayes River.

Labrador was discoved by John Cabot in 149 It was re-discovered by Hudson in 1610. In 16 the Hudson's Bay Company was incorporated, a it soon rose to prosperity. [Furs and Fur-Trad Vancouver Island, on the coast of the No Pacific Ocean, was granted by the British gove ment to the Hudson's Bay Company in Aug 1848.

HUDSON'S BAY COMPANY. [Furs, a Fur Trade.]

HUE AND CRY was the old common-l process of pursuing with horn and voice all fel and such as had dangerously wounded anot This process is still used in England as a mean arresting felons without the warrants of a jus

of the peace. Hue and cry may be raised either by the precept of a justice of the peace, or by a private person who knows of the felony, who should acquaint the constable of the vill with the circumstances and the person of the felon; if the constable is absent, hue and cry may be made without licence. When hue and cry is raised, all persons are bound to join in the pursuit and assist in the capture of the felon. A constable also who has a warrant against a felon may follow him by hue and cry into a different county from that in which the warrant was granted, without having the warrant backed. The pursuers are justified in breaking the outer door of the house where the offender actually is, and are not liable to any punishment or suit if it should appear that the hue and cry was raised by mistake, but the person raising the hue and cry wantonly and maliciously may be severely punished as a disturber of the public peace.

A printed sheet called the 'Hue and Cry' is issued three times a week from the Police Court, Bow Street, which contains descriptions of property stolen, notices of robberies, and descriptions of soldiers who have deserted. Copies of this paper are sent to the police offices throughout the country. The 'Hue and Cry' is published at the expense of the Home Office, and costs about 1200*l.* a year.

HUERTA, VICENTE GARCIA DE LA, was born in 1729, at Zafra in Estremadura. The reputation of his fine tragedy, 'La Raquel,' was very great. Huerta died at Madrid in 1797. Besides an inferior tragedy, 'Agamemnon vengado,' he published 'Vocabulario Militar Español,' which portrays the great Spanish captains; 'Obras Poeticas,' 2 vols. 8vo., and a classical selection out of the large store of Spanish dramas, which he entitled 'Theatro Español,' 16 vols. 8vo.

HUET, PIERRE DANIEL, in Latin *Huetius*, bishop of Avranches, was born at Caen, Feb. 8, 1630. He was appointed in 1670 sub-tutor to the Dauphin. During the next twenty years he was principally engaged in superintending the publication of the edition of the classics 'In usum Delphini,' usually known by the name of the Delphin Classics. He died Jan. 26, 1721, at the age of 91.

The best known of Huet's works is his 'Demonstratio Evangelica,' which was published originally at Paris in 1679, and has since been frequently reprinted.

HUGUENOTS was the name given to the early followers of the Reformed or Calvinist religion in France. The word is now obsolete, and has been replaced by that of 'Réformés,' which is given to the disciples of Calvin, or of the church of Geneva, in contradistinction to that of Lutherans, or Protestants, properly so called. The wars and persecutions of the Huguenots are mentioned in the articles BARTHOLOMEW, ST.; CHARLES IX.; COLIGNY; and HÔPITAL, DE L'.

HUGHES, JOHN, the son of a citizen of London, was born in 1677, at Marlborough in Wiltshire. He was educated in London, chiefly at a dissenting academy. In 1717 he was appointed by Earl Cowper to be clerk to the commissions of the peace. Several occasional poems and translations, the earliest of which, in 1697, celebrated the peace of Ryswick, introduced him to the acquaintance of Addison, Pope, and other literary men. Hughes wrote a tragedy called the 'Siege of Damascus,' which was acted for the first time on the 17th of February, 1720, and received much applause. The author that night lay on his death-bed, and he expired before morning. Hughes wrote some papers for the 'Tatler' and 'Guardian;' and to the 'Spectator' he contributed eleven numbers and a good many letters.

HULL, or KINGSTON-UPON-HULL, is a borough and county of itself. It is the chief town in the East Riding of Yorkshire, and is situated on the north side of the æstuary of the Humber, where it is joined by the river Hull. It is distant 174 miles N. from London. Hull returns two members to parliament.

For municipal purposes Hull is divided into 7 wards, with 14 aldermen and 42 councillors. The population of the town in 1841 was 41,629. The population of the parliamentary borough was 65,670.

This place took its name of Kingstown from its purchase by Edward I., who saw the great natural advantages of its position, and determined on the foundation of a fortified town and port.

The exports of Hull formerly were chiefly wool, woolfells, and leather; its imports, wine and timber. At present the coasting trade is one of its chief branches of profit. It has also an extensive commerce with the Baltic, with the north of Germany, Holland, and Denmark. The Greenland fishery owed its revival, about 1766, and its subsequent importance, to the mercantile enterprise of Hull. The facilities of communication between Hull and the interior of the kingdom are numerous; the Ouse, Trent, Aire, and Calder, all communicate with the Humber, and these means of internal communication are extended by the York, Newcastle and Berwick Railway, the York and North Midland Railway, and the Hull, Selby, and Leeds Railway. The prosperity of Hull has been greatly increased by the progress of steam-navigation, and it may be considered as the second great centre of this mode of transit on the eastern coast.

Hull has large docks and extensive quays. The number of registered sailing-vessels, Jan. 1, 1848, was 462 (64,951 tons). The number of steam-vessels was 28 (5658 tons).

The manufactures of Hull are neither numerous nor extensive. The expressing and refining of oil from linseed is effected by wind-mills and steam-mills; the residue of the seed is prepared as food for cattle. There is a large sugar-house, a soap manufactory, several white-lead works, ship-builders' yards, turpentine and sail-cloth manufactories, extensive ropewalks, and several breweries.

The town-house is a plain brick edifice, at the rear of which is a court-house, and a building for the court of requests: the other law-courts are the county court, and the court of venire for determining civil causes. The quarter-sessions are held in the Guildhall. The gaol and house of

correction is in Kingston Street on the Humber bank. The citadel, which is on the east bank of the river Hull, at its junction with the Humber, is surrounded by a wall, with ramparts and ditches, and is occupied by a regular garrison. There is a handsome equestrian statue of William III. in the Market Place, which is covered with leaf gold. The Wilberforce Memorial is a fine fluted Greek Doric column, on a square pedestal, surmounted by a statue of Mr. Wilberforce.

The educational charities are — the Trinity House school; the Vicar's school; Cogan's charity school for girls; the national school, which is open to children of all denominations; the Sculcoates and Drypool national schools; the Catholic free-school; the British and Foreign school; the Savings' Bank school; and the Sunday-schools which are attached to the various denominations of Christians. The Hull College and Kingston College were more recently established. The latter is exclusively for education on the principles of the established church; the other is open to all. The other educational institutions of Hull are the Literary and Philosophical Society, which possesses an excellent museum; the Mechanics' Institute, which has a good library, the Hull Subscription Library, and the Lyceum Library. The Hull Philosophical Society occupies a part of a splendid pile of buildings in Kingston Square. These rooms were erected for public meetings, concerts, and lectures. Hull has several musical societies, and a convenient theatre.

The General Infirmary of Hull was commenced in 1782. The other medical institutions are the Dispensary, established in 1814, the Refuge for the Insane, the Dispensary for Diseases of the Eye and Ear, and the Hull and East-Riding School of Medicine and Anatomy. The Botanic Garden, established in 1811, is about a mile from the town.

The Holy Trinity church is the most ancient in Hull, and is very large. It is 272 feet long from east to west. The other churches are those of St. Mary's, St. John's, the Mariners' church, the parish churches of Drypool and Sculcoates, St. James's church, and Christ church. The Unitarians, Swedenborgians, Primitive Methodists, New Connexion Methodists, Church Methodists, Catholics, Friends, Jews, Baptists, Wesleyans, and Independents have all their places of worship.

The endowed charities which have not yet been enumerated are the Charter-house, and the following hospitals or almshouses—Gregg's, Harrison's, Ratcliff's, Weaver's, Crookhay's, Gee's, Lister's, Crowle's, and Watson's.

HUMBER. [YORKSHIRE.]

HUMBLE-BEE. The technical characters of the insects called humble-bees are given under the head BOMBUS. In the present article the habits and economy of the species are all that remain to be noticed.

In the autumnal months, when the cold weather begins to be felt, and the various honey-yielding flowers disappear, the male and neuter humble-bees die, having performed their allotted task, which, as far as we can discover, appears to be that of fecundating certain plants, by conveying the pollen from the male to the female flowers; a task which is unavoidably accomplished by their visiting different flowers for the purpose of collecting honey and pollen to rear their young. Some female humble-bees also die, whereas others (probably those only which had been reared in the previous summer) seek a convenient spot in which they may pass the winter as little exposed to the cold as possible; sometimes in rotten wood of old pollard trees, and sometimes in moss, or among dead leaves, or in fact in almost any situation which will afford the desired protection. Here they remain in a torpid state and without food. The warmth of the spring causes these females again to make their appearance, and, having been impregnated the previous autumn, they seek a convenient spot wherein they may construct their nests. Grassy banks are the localities most frequently chosen for this purpose, but various situations, and even a difference of soil apparently, are selected by the different species of humble-bees. The nests are sometimes built upon the ground, but most generally they are in a hole said to be excavated by the bee, but sometimes perhaps they avail themselves of the holes made by moles or other animals. A small cylindrical but generally tortuous gallery is formed, which is terminated by an arched chamber of considerable extent, and it is in this chamber that the nest is constructed. Those species which do not burrow in the ground choose a situation in which the herbage is sufficiently thick to afford shelter, and there form on the surface of the ground an arched chamber of moss thickly matted together. Having collected a quantity of pollen and honey, these substances are formed by the female humble-bee into a ball, in which the eggs are deposited, so that when the eggs are hatched the larvæ are surrounded by the substance, which serves them both for food and protection. The balls generally contain numerous eggs, and consequently, when these are hatched, numerous larvæ. Réaumur found them to vary from three to thirty. Each larva feeding upon the food nearest to it, the original crust of their inclosure becomes thin, and the parent insect then takes care to add fresh alimentary paste to the weakest parts. When the larvæ are full grown, each one incloses itself in a silken cocoon of an oval form, and placed always in a perpendicular position. A certain number of neuters, or workers, having undergone their final transformation, the nest is enlarged, and an inner coating of wax is attached to it, and in those nests which are constructed with moss the particles of wax are so amalgamated with it, that a portion of the moss cannot be removed without injuring the interior more or less. Wax is also used by the workers in the construction of little cells for the reception of honey. Each species of humble-bee makes these cells, as Huber informs us, in a different manner.

The male humble-bees are not reared till late in the season, and do not appear in any abundance till the autumn. As in the case of the hive-bee, therefore, they take no part in the duties of rearing the young, which it appears are almost en

tirely under the protection of the neuters as soon as they are hatched.

When the nest is tolerably well peopled, it presents a mass of oval cocoons, spun by the larvæ as before described, interspersed with which there are numerous masses of an irregular but generally somewhat rounded form, and of a brown colour: some of the largest are about the size of a small walnut. Each of these masses incloses either eggs or larvæ, and is composed of pollen mixed with honey. To these must be added the little honey-pots which are irregularly interspersed with the cocoons.

HUMBOLDT, KARL WILHELM, BARON VON, was born at Potsdam, June 22, 1767, and studied law in the universities of Göttingen and Jena. He was thirty-three when he published his first production, which was a critical essay on Göthe's poem of 'Hermann and Dorothea;' but this work at once established his fame, and it is still considered as a model of æsthetical criticism. In 1802 Humboldt was appointed resident, and, a few years afterwards, minister plenipotentiary at the Holy See. In 1812 he was sent as ambassador to Vienna, and afterwards discharged the functions of minister-plenipotentiary of Prussia, together with Hardenberg, at the Congress of Vienna. He continued his diplomatic career at Frankfort, where he made himself conspicuous through his conciliatory eloquence in the delicate business of dividing Germany among its princes, and afterwards as ambassador at the court of St. James's. In 1819 he was appointed minister and a privy councillor at Berlin. Humboldt and the ministers von Beyme and von Boyen tried to persuade the king to be faithful to those liberal principles which he had proclaimed in 1813, and to introduce a general national representation. Unable to stem the king's policy, Humboldt, Beyme, and Boyen tendered their resignation, and Humboldt retired to Tegel, where he henceforth devoted all his time to literature. He died April 8, 1835. During forty years he had enjoyed the well-deserved reputation of one of the greatest linguists of Europe. With the exception of one large work which he left unfinished, Humboldt composed only minor works, consisting of critical essays, poems, translations from the Greek, and remarks on the oriental languages, which he published at different periods. The greater part of them was collected by his brother Alexander, and published under the title, 'Wilhelm von Humboldt's Gesammelte Werke,' Berlin, 1841, 4 vols. 8vo.

HUMBOLDTINE, mineral *oxalate of iron*. This substance occurs crystalline and massive. The crystalline form is undetermined, but is yellow and opaque. The massive variety occurs in small, flattish, reniform pieces, of a fine earthy structure; colour greenish yellow.

HUMBOLDTITE. This mineral is a *borosilicate of lime*. It occurs crystallised. Primary form an oblique rhombic prism; colour white and yellowish white. Opaque. Specific gravity 2·99.

HUME, DAVID, was born at Edinburgh on the 26th of April, 1711. His father's family was a branch of that of the earl of Home, or Hume; but Hume inherited only a slender patrimony. His father died when he was very young, and his mother destined him for the law; but for this he showed no inclination, and it was eventually given up.

In 1737 he went to Bristol, with some recommendations to eminent merchants, but in a few months, finding that scene totally unsuitable to him, he went over to France with a view of prosecuting his studies. He first went to Rheims, and thence to La Flèche in Anjou; and at these two places he composed his 'Treatise of Human Nature.' It was published in London in 1738, but fell dead-born from the press. In 1742 he published at Edinburgh the first part of his Essays, which was on the whole favourably received.

In 1745 Hume went to live with the Marquis of Annandale as a companion, and afterwards acted as secretary to Gen. St. Clair, principally during his military embassy to Vienna and Turin.

On his return to England he went to reside with his brother in Scotland, and composed his 'Political Discourses,' and his 'Enquiry concerning the Principles of Morals.' These two works were published in 1752. In the same year he was appointed librarian to the Faculty of Advocates. He now formed the plan of writing the 'History of England.' Priding himself much on his own impartiality, he was bitterly disappointed when, on the appearance of the first volume, he was accused on all hands of onesidedness.

In the interval between the appearance of the first and that of the second volume of his History, he published his 'Natural History of Religion,' against which a violent pamphlet was written by Dr. Hurd. The second volume of the 'History of England' was published in 1756. 'This performance,' he says, 'happened to give less displeasure to the Whigs, and was better received. It not only rose itself, but helped to buoy up its unfortunate brother.' 'The History of the House of Tudor' was published in 1759; and the two volumes, containing the earlier English history, which completed the work, in 1761.

He availed himself, in 1763, of an invitation from the Earl of Hertford to accompany him on his embassy to Paris, where his literary fame brought him much attention. When Lord Hertford was, in 1765, appointed Lord Lieutenant of Ireland, Hume remained at Paris as *chargé d'affaires* till the arrival of the Duke of Richmond. He returned to England in the beginning of 1766, and the year after was appointed Under-Secretary of State. He held this appointment about two years, and then returned to Edinburgh. He died on the 25th of August, 1766, in his 66th year.

The editions of Hume's 'History' are numerous. The best edition of his philosophical works is one published in Edinburgh, in 1826, in 4 vols. 8vo. J. H. Burton, Advocate, Edinburgh, has recently published a Life of Hume, with many letters never before printed.

HUME, JAMES DEACON, was born April 28, 1774, at Newington in Surrey, and was educated at Westminster School.

In 1790, when at the age of sixteen, Mr. Hume was appointed to a clerkship in the Custom House, and at an unusually early age he was ap-

pointed to fill an office of much responsibility in the department. His value came to be highly appreciated by the government, and in 1823 he was appointed to reduce into one simple code the many hundred statutes (upwards of 1500) which at that time formed the Custom-house legislation. Three of the most valuable years of his life were devoted to the task; for the performance of which Mr. Hume was presented by the treasury with the sum of 5000*l.* over and above the salary of his office, from the duties of which he had been relieved during the period devoted to the task; and from that time scarcely any question of importance was decided which had reference to the trade of the country without his opinion concerning it having first been obtained. At length, in July 1829, his services were wholly transferred to the Board of Trade, where an office was created for him as Joint-Assistant Secretary. Mr. Hume died Jan. 12, 1842, in the 68th year of his age.

He wrote several papers upon subjects connected with commerce, which appeared from time to time in the 'British and Foreign Review.'

HUMIDITY is that property of a substance by which it communicates to a body in contact with it some of a liquid which it may have absorbed; and the term is commonly applied to the atmosphere when it is in a state to deposit moisture upon bodies in it.

The humidity of the atmosphere is caused in a great measure by the evaporation of water from the seas, lakes, &c., of the earth; and the quantity of moisture which a volume of air is capable of containing depends upon the temperature. If that be increased, the power of receiving more vapour increases; and, the atmosphere becoming saturated with moisture, if the temperature be suddenly lowered, a precipitation of water takes place.

The humidity of the atmosphere generally decreases from the surface of the earth upwards; and, when the density of the lower strata is great, the clouds ascend into the drier regions, where they are readily absorbed. This circumstance accounts for the fact that, when the mercury rises in the barometer, the weather frequently becomes fair.

Dr. Dalton found by experiment that a body of earth one foot in depth, when saturated with moisture, contains seven inches in depth of water, and that it may lose one-fourth or one-half of that quantity without becoming incapable of supporting vegetation.

The effects of humidity on the dimensions of bodies are various: when a watery vapour penetrates between the twisted fibres of cordage, which are vegetable materials, the cordage swells out transversely, and thus becomes shortened; while cords made of animal substances become relaxed by humidity and increase in length. Most salts absorb water, and thereby increase in weight.

HUMIRIA'CEÆ, a natural order of plants belonging to the syncarpous group of polypetalous Exogens. There are three genera belonging to this order, *Humirium*, *Helleria*, and *Sacoglottis*.

H. balsamiferum, a tree forty feet in height, is a native of Guyana. Its bark is thick, and abounds with a red balsamic fluid, which resembles styrax in smell; after it has exuded from the tree it becomes hard and transparent, and when burnt affords an agreeable odour. The negroes and natives of Guyana use the bark in slips for the purpose of flambeaux; they also use the wood in building their houses. The other species of *Humirium*, and also those of *Helleria* and *Sacoglottis*, yield resinous juices.

HUMMEL, JOHANN NEPOMUK, a composer and performer, was born at Presburg in 1778. At a very early age he received instructions in music from his father, a master at the military institution of Wartberg, and there received two years' instruction from Mozart. In his tenth year he set out on a visit to the principal cities of Germany, Denmark, and Holland, and reached London in 1791, where he was much noticed.

At the expiration of six years Hummel returned to Vienna, pursued the study of composition under Albrechtsberger, and further improved himself by friendly intercourse with Salieri. In 1803 he engaged in the service of Prince Esterhazy; and a few years after he took an active part in the management of the Imperial Theatre, and produced several successful operas. In 1811 he withdrew from the prince's establishment, and wholly dedicated the next five years to giving instruction in music and to composition.

In 1816 he became kapellmeister to the King of Würtemberg, in whose service he remained till the year 1818, when he engaged himself in the same capacity to the Grand-duke of Weimar, which appointment he retained to the close of his life. But his duties at the court of Weimar were not of a nature to prevent his frequent journeys to other countries. In 1821 he made a very profitable visit to St. Petersburg and Moscow, and two years after to Amsterdam. In April 1830, Hummel arrived in London, and gave concerts which were very attractive; he repeated his visits in 1831 and 1833. He returned to Weimar, and had the order of the White Eagle conferred on him. He died in October 1837, leaving a widow and two sons amply provided for.

Hummel's compositions are very numerous. Of his operas, 'Mathilde von Guise' is the best; and in his two masses, in D minor and E flat, are clever and charming movements. But his reputation will rest on his piano-forte works, and on his masterly skill as a player on that instrument.

HUMMING-BIRD. [TROCHILIDÆ.]

HU'MULUS LU'PULUS, a perennial plant belonging to the natural order *Urticaceæ*, is a coarse twiner inhabiting hedges in many parts of Europe, and is also found apparently wild in the United States of America.

The female flowers, termed cones, strobuli, or catkins, of *Humulus lupulus*, when ripe, constitute hops, which, independent of their employment in brewing, are of considerable utility in medicine.

The valuable principle of the hop is called *Lupuline*, and is contained in little glands on the fruit. The superiority of the hop, as an ingredient in our malt liquors, depends upon the fact of its

containing within itself several distinct and independent elements of activity, which the bitter herbs that have at different times been employed as a substitute do not possess. The bitter principle imparts to the beverage a tonic quality and an agreeable flavour; while at the same time an aromatic ingredient adds a warmth and stimulating property, and modifies the bitterness: it likewise contains an astringent principle (tannin), the effects of which are to precipitate the vegetable mucilage, and thus to remove from the beer the active principle of its fermentation: every attempt therefore to substitute an ordinary bitter for that of the hop must necessarily fail, unless a compound can be so artfully constructed as to contain in due proportions the principles of bitterness, astringency, and aroma.

The aromatic bitter gives to the hop a very marked power over the digestive organs when debilitated. A narcotic property has also been ascribed to this plant, which is denied to it by some writers, who attribute the intoxicating power of beer entirely to the alcohol and carbonic acid which it contains. Yet there can be no doubt that tincture of hops, and even extract of hops, possess sedative powers, and often procure quiet and sleep where opium cannot be borne. Decoction does not seem to be a judicious mode of preparation, and should not be practised. Lupuline has been administered alone, but this does not possess any advantage over the tincture.

HUMUS. [Arable Land.]

HUNDRED. [Shire.]

HUNGARIAN BANATE. [Hungary.]

HUNGARIAN LITTORALE. [Croatia.]

HUNGARY. Under the denomination of *Hungarian Hereditary Dominions* are comprehended Hungary Proper, Slavonia, Croatia, Transylvania, Dalmatia, and the Military Frontier. The kingdom of Hungary, united under the same civil government, as determined after the peace in 1815, comprehended Hungary, Slavonia, and Croatia, to the last of which the circle of Carlstadt (which previously made part of Illyria), and the Hungarian Littorale, or sea-coast, were annexed in 1822. The kingdom, within the above limits, is bounded N. by Moravia, Silesia, and Galicia; E. by Transylvania; S. by the Military Frontier and the Gulf of Quarnero; and W. by Illyria, Styria, Lower Austria, and Moravia. It extends from 14° 26′ 22″ to 25° 3′ 24″ E. long., and from 44° 43′ 25″ to 49° 50′ 45″ N. lat. The area of the kingdom amounts to 87,812 square miles: namely, the Hungarian counties, 78,275 sq. miles; the Hungarian districts (not included in the counties), 2301 sq. miles; Slavonia, 3616 sq. miles; and Croatia, 3620 sq. miles. The population in 1842 was 10,500,000, besides 66,243 military.

Divisions.—The kingdom of Hungary is divided into Hungary Proper, Slavonia, Croatia, and certain privileged districts, viz. 1, in Hungary, Jazyga (Jaszág), Great Kumania (Nagy-Kunsag), Little Kumania (Kis-Kunsag), the Heyduke towns (Hajdu-Varosok), and sixteen towns of the county of Zips; 2, in Croatia, the Hungarian Littorale, or sea-coast.

I. Hungary Proper is divided into four circles.

The Circle on this side of the Danube has an area of 22,368 square miles, 26 cities, of which three are bishops' sees, 176 towns, 2507 villages, and 93 hamlets. It includes 13 counties, and 3 small districts. 1. *Presburg:* chief towns, Presburg, 38,386 inhabitants; Tyrnau, 6790 inhabitants. 2. *Neitra:* chief towns, Neitra, with a Roman Catholic bishop, 4800 inhabitants; Neuhäusel, 6700 inhabitants; Skalitz, 7126 inhabitants; Freystädt on the Waag, 4000 inhabitants; Neustadt on the Waag, 4700 inhabitants; Mijawa, 8600 inhabitants. 3. *Trentsin:* chief towns, Trentsin, 3350 inhabitants; Rajecz, 4360 inhabitants. 4. *Thurocz:* chief town, St. Martin, 1900 inhabitants. 5. *Arva:* chief towns, Also-Kubin, 1100 inhabitants; Trsztena, 2650 inhabitants. 6. *Liptau:* chief towns, St. Nicholas, 4160 inhabitants; Deutsch-Liptsch, 3000 inhabitants; Rosenberg, 2532 inhabitants. 7. *Sohl:* chief towns, Neusohl, 10,069 inhabitants; Bries, 3500 inhabitants; Harpfin, 3360 inhabitants. 8. *Bars:* [Bars] Kremnitz, 5500 inhabitants; Königsberg, 3800 inhabitants. 9. *Honth:* chief towns, Schemnitz, 23,000 inhabitants; Pukanz, 2512 inhabitants. 10. *Gran:* chief town, Gran, an archbishop's see, had 1136 houses, and 11,600 inhabitants; but half the town was destroyed by the inundation of the Danube in the spring of 1838. 11. *Neograd:* chief towns, Balassa-Gyarmath, 4300 inhabitants; Gatsch, 4000 inhabitants. 12. *Pesth:* chief towns, Pesth and Buda, which together have a population of about 100,000, the Danube running between them [Buda; Pesth]; Waitzen, 11,271 inhabitants; Ketskemet, 35,876 inhabitants; Great Koros, 13,697 inhabitants; Little Koros, 8000 inhabitants; Czegled, 14,662 inhabitants; Kalotscha, an archbishop's see, 7406 inhabitants. 13. *Bacs*, or *Batsch:* chief towns, Zombor, 21,086 inhabitants; Maria Theresienstadt (or Theresiopel), 34,924 inhabitants; Neusatz, 20,231 inhabitants; Baja, 14,534 inhabitants; Szenta, 13,937 inhabitants; Old Becze, 11,132 inhabitants; Kanisa, 9137 inhabitants. In this county is the privileged Theiss district, an inalienable domain of the crown, containing 16 large villages. [Bacs.]

The Circle beyond the Danube has an area of 6632 square miles, 10 cities, of which 2 are bishops' sees, 190 towns, 2571 villages, 1059 hamlets. It includes 11 counties. 1. *Wieselburg:* chief towns, Wieselburg, 2957 inhabitants; Ungrisch-Altenburg, 2586 inhabitants. 2. *Oedenburg:* chief towns, Oedenburg, 13,000 inhabitants; Eisenstadt, 5386 inhabitants; 3. *Komorn:* chief towns, Komorn, a strong fortress (partially burnt in 1848), with 17,782 inhabitants; Tata, or Dotis, 8740 inhabitants. 4. *Raab:* chief town, Raab, 16,168 inhabitants. 5. *Stuhlweissenburg:* chief towns, Stuhlweissenburg, 20,069 inhabitants; Moor, 5300 inhabitants. 6. *Wesprim:* chief town, Wesprim, 8930 inhabitants. 7. *Eisenburg:* chief towns, Güns, 5960 inhabitants; Stein am Anger (the Roman Sabaria), a bishop's see, 3980 inhabitants. 8. *Szalad:* chief towns, Szala-Egerszegk, 3116 inhabitants; Kessthely, 6930

inhabitants; Gross Kanisa, 5900 inhabitants. 9. *Tolna:* chief towns, Szekszard, or Sexard, 8150 inhabitants; Földvar, 8979 inhabitants; Paks, 7292 inhabitants. 10. *Szümegh:* chief town, Kaposvar, 3072 inhabitants. 11. *Baranya:* chief towns, Fünfkirchen, a bishop's see [FÜNFKIRCHEN]; Mohacs, 8316 inhabitants. [BARANYA.]

The Circle on this side of the Theiss has an area of 6248 square miles, 8 cities, of which 2 are bishops' sees, 120 towns, 2285 villages, 505 hamlets. It includes 10 counties, and 2 small districts. 1. *Heves:* chief towns, Erlau, an archbishop's see, 18,247 inhabitants; Gyöngyös, 11,820 inhabitants; Szolnok, 11,565 inhabitants; Mezo-Tur, 4160 inhabitants. 2. *Borsod:* chief towns, Miscolcz, 27,638 inhabitants; Diös-Györ, 4500 inhabitants. 3. *Torna:* chief town, Torna, 1400 inhabitants. 4. *Abaujvar:* chief towns, Kaschau, 13,600 inhabitants; Upper and Lower Metzenseifen, together 5459 inhabitants. 5. *Gömör:* chief towns, Sajo-Gömör, 4000 inhabitants; Rosenau, a bishop's see, 9000 inhabitants; Gross-Steffelsdorf, 8027 inhabitants; Dobschau, 4836 inhabitants. 6. *Zips:* chief towns, Leutschau, 5175 inhabitants; Kesmark. or Kaisersmark, 5900 inhabitants; Göllnitz, 5000 inhabitants; Schmollnitz, 5500 inhabitants. 7. *Sarosch:* chief towns, Eperies, 9000 inhabitants; Zeben, 2930 inhabitants; Bartfeld, 5100 inhabitants; Salzburg, or Sovar, 4000 inhabitants. 8. *Unghvar:* chief town, Unghvar, 6224 inhabitants. 9. *Zemplin:* chief towns, Sator-Allya-Ughely, 6520 inhabitants; Saros-Patak, 9500 inhabitants; Tokay, 4200 inhabitants; Zemplin, which gives its name to the country, is a small place. 10. *Beregh:* chief towns, Beregh-Szass, 4500 inhabitants; Munkatsch, 5000 inhabitants.

The Circle beyond the Theiss has an area of 26,528 square miles, 6 cities, of which 2 are bishops' sees, 1782 villages, 478 hamlets. It includes 12 counties and 1 district. 1. *Szabolts:* chief towns, Nagy-Kallo, 5342 inhabitants; Nyir-Egyhaza, 15,640 inhabitants. The Heyduke towns are in this county. 2. *Szathmar:* chief towns, Neustadt, or Great Banya, 4928 inhabitants; Great Karoly, 11,055 inhabitants; Ungrisch-Neustadt, or Felso Banya, 4700 inhabitants; Szathmar-Nemeti, 14,279 inhabitants. 3. *Marmaros:* chief towns, Szigeth, 6500 inhabitants; Huszth, 2712 inhabitants; Visk, 2036 inhabitants; Korosmezo, 3856 inhabitants. 4. *Bihar:* chief towns, Gross-Wardein, 16,000 inhabitants, a bishop's see; Debreczin, 45,375 inhabitants. 5. *Ugocs:* chief town, Nagy Szöllos, 2300 inhabitants. 6. *Bekes:* chief towns, Gyula, 13,751 inhabitants; Bekes, 14,682 inhabitants; Szarvas, 14,131 inhabitants; Csaba is a village, the largest in Europe, having 22,143 inhabitants. 7. *Csongrad:* chief towns, Szegedin, 32,209 inhabitants; Hod-Mezo-Vasarhely, 25,806 inhabitants; Szentes, 15,800 inhabitants; Csongrad, 12,422 inhabitants. 8. *Csanad:* chief towns, Mako, 17,148 inhabitants; Csanad, 6730 inhabitants. 9. *Arad:* chief towns, Alt-Arad, 13,824 inhabitants; Peczka, 13,440 inhabitants. 10. *Torontal:* chief towns, Nagy Beczkerek, 12,623 inhabitants; Nagy St. Miklos, 14,222 inhabitants; Nagy Kikinda, 12,344 inhabitants. 11. *Temes:* chief towns, Temesvar, 12,666 inhabitants; Versecz, 17,000 inhabitants. 12. *Krassova:* chief town, Lugos, 6150 inhabitants. Torontal, Temes, and Krassova constitute the district called the *Banat,* with an area of 7048 square miles.

Besides these 46 counties Hungary includes the following privileged districts:—1. *Jazyga* (Jaszag): chief town, Jasz Berény, 15,529 inhabitants. 2. *Great Kumania* (Nagy-Kunsag): chief town, Karszag Uj-Szallas, 12,000 inhabitants. 3. *Little Kumania* (Kis-Kunsag): chief town, Felegyhaza, 15,000 inhabitants. 4. The district of the seven *Heyduke* towns, within the county of Szabolts: chief town, Boszormeny, 14,660 inhabitants.

II. SLAVONIA is divided into three counties. 1. *Posega:* chief town, Posega, 4100 inhabitants. 2. *Verovicz:* chief town, Essek, 11,077 inhabitants. 3. *Syrimia:* chief towns, Illok, the capital; and Ruma, 6170 inhabitants.

III. CROATIA. [See CROATIA.]

The entire *Military Frontier* is a tract of land extending from the Adriatic Sea along the Turkish frontier to the Buckowina. It has an area of 18,123 square miles. The population is 1,220,503, which includes 18 regiments and 2 battalions.

Face of the Country, Soil, Climate.—The northern and western parts of the kingdom are very mountainous. The Carpathians on the north, and the Alps on the frontier south of the Danube, surround almost the whole kingdom like a girdle, and send out numerous branches which cover nearly thirty-three counties. The loftiest summits have an elevation of from 7000 to 8000 feet. Of the numerous valleys inclosed in the Carpathian Mountains, the Waagthal (Valley of the Waag) is one of the most beautiful.

Nearly the whole of Hungary lies within the basin of the Danube. The Theiss, itself a branch of the Danube, is one of the chief rivers, and its basin may be considered as forming a distinct part of Hungary. The Drave, the Raab, the Leitha, the March, the Waag, the Gran, &c. flow into the Danube. The Zagyva, Sajo, Hernad, Bodrog, Koros, Maros, Temes, &c. flow into the Theiss. Of the lakes the most considerable are —the Plattensee [BALATON], 46 miles long, and 3½ miles mean breadth, and the Neusiedl, about 24 miles long, and from 3 to 7 miles broad, both of which are in the west part of the country. Many canals have been made in different tracts of Hungary, partly to drain the marshes, and partly for the purposes of commerce.

The soil of Hungary is for the most part clayey and sandy. The best and richest mould is in the southern part. The climate varies considerably. In the counties nearest the snow-covered mountains it is so cold, and the winter so long, that the snow generally begins in September, and does not melt till May or even June. In the southern counties the snow seldom lies on the ground more than two or three weeks.

In the abundance, variety, and value of its natural productions Hungary excels almost any country in Europe. Corn is the main product of Hungarian agriculture, especially in the south

Fruit grows everywhere, even at the foot of the Carpathians. There are whole forests of cherry, plum, and chestnut trees. In the south, lemon and orange-trees blossom the whole summer in the open air. The grape is most abundant; the wine of the Hegyalla district is renowned by the name of Tokay. It is supposed that a million acres are appropriated to the grape culture.

Of domestic quadrupeds the horned cattle are some of the finest in Europe. The breed of sheep has been much improved. Horses, swine, and poultry are largely reared. Bears, wolves, and various birds of prey are met with in the forests. Hungary has metals of almost all kinds except tin; and it produces likewise a great variety of precious stones, such as amethyst, agate, jasper, Hungarian diamonds, garnets, &c.

Manufactures and Trade.— The inland trade of the kingdom is very active, and the foreign commerce of great importance. The exports consist of the natural produce of the kingdom; the imports chiefly of manufactures (of which woollens, cottons, silks, and linens make one-half), and some foreign luxuries.

Nations, Language, and Religion.—There is perhaps no country of the same extent which contains such a variety of nations as Hungary. The Magyars, or proper Hungarians, are originally an Asiatic people; there are also Wallachians, Armenians, Germans, Italians, Jews, Servians, Russniaks, Slovacs, Croats, and Wends. The inhabitants, except the Jews, are all Christians. The Roman Catholic religion is predominant. The Roman Catholics have three archbishops and seventeen bishops. The united Greeks have four bishops. The Non-united Greeks have an archbishop and six bishops. Since 1792 their bishops have had seats in the diet of the kingdom. The Protestants have no bishops, but are governed by superintendants and synods.

With respect to education, Hungary is in a very backward state, though there are schools in every parish. There are also a few academies, many gymnasia, a lyceum at Erlau, a university at Pesth, two schools for philology, a famous mining-school at Schemnitz, and many others.

The Constitution of Hungary was called a limited monarchy, of which it had indeed all the forms, but aristocracy was predominant, and the nobles had great power. The constitution is now (1849) the subject of a civil war.

The Revenue is derived partly from the income of the inalienable domains of the crown, and partly from certain monopolies, of which that of salt is the most considerable. From Nov. 1, 1845, to Oct. 31, 1846, its amount was 23,697,255 florins; and the expenses, 23,461,198 florins. In 1842 the national debt was 970,000,000 florins.

History.—The oldest known inhabitants of the country were the Pannonians. In 377 the Huns established a power here, which was overthrown in 489 by the Goths and Gepidæ. These yielded in 526 to the Lombards; and when the latter removed to Italy, in 568, the Avari entered, who extended their dominion to Bavaria, but were conquered and compelled to embrace Christianity by Charlemagne. In the ninth century the Magyars, originally a people from central Asia, penetrated into the country, and conquered it in ten years. Arpad, the chief of the Magyars, became duke of Hungary. His grandson Geysa embraced Christianity, and Geysa's son Stephen assumed the title of king in the year 1000. In the reign of Peter, who succeeded Stephen, the kingdom was disturbed by the struggle between Christianity and paganism. Andrew I. (or Andreas) reigned from 1046 to 1061. He fell in a battle with his brother Bela I., who succeeded him on the throne. Ladislaus I. subdued Slavonia and Croatia in 1089. Calomann conquered Dalmatia in 1102. Bela II. obtained Bosnia, and Emerich obtained Servia. Andrew II. was the son of Bela III., and reigned from 1205 to 1235. Andrew III. came to the throne in 1290, and was the last king of the family of Arpad, which became extinct in the male line in 1301. In 1310 Charles, brother to Louis IX. of France, was crowned king of Hungary. Charles having married a sister of Casimir, king of Poland, Louis, one of his sons, succeeded to that kingdom in 1370. On his death Poland and Hungary were again separated, and internal troubles broke out. The country eventually fell under the dominion of the House of Austria. Shortly after the French revolution of 1848 the country became disturbed by attempts to obtain political reforms of various kinds, which ultimately led to a civil war that has not yet (Feb. 1849) been terminated.

HUNGERFORD. [BERKSHIRE.]

HUNS, HUNNI, the name given by historians to several nomadic Scythian tribes which devastated the Roman empire in the fifth century. They inhabited the plains of Tartary near the borders of the Chinese empire for several centuries before our æra, and it was to put a stop to their incursions that the Chinese built their great wall about two centuries before Christ. In after times they became divided into the Northern and Southern Huns. The northern Huns, being defeated by the Chinese about A.D. 93, emigrated westward as far as the Volga, where they defeated the Alani. They then encamped in the plains between the Volga and the Tánais, and as far south as the ridge of the Caucasus, where they remained for more than two centuries. Under the Emperor Valens they first crossed the Cimmerian Bosporus, drove before them the Ostrogoths and Visigoths, and obliged the latter to cross the Danube, when the emperor granted them lands in Thrace. The Huns had frequent wars with the Romans. [ATTILA.] After the death of Attila the various tribes under his sway quarrelled among themselves, and being attacked by the Goths they were driven back beyond the Tanais. Part of them settled in Pannonia, to which they gave the name of Hungary; but the present Hungarians, or Magyars, came from a different immigration.

HUNTER, WILLIAM, was born in 1718 at Long Calderwood, near Glasgow. He was entered at the university of Glasgow in 1732, and remained there for five years studying for the church; but, while hesitating whether he should pursue that profession, he met with Cullen, who was at that time practising as a surgeon and

apothecary at Hamilton. An intimate friendship was soon formed between them, the result of which was that Hunter determined to study medicine, and to practise in partnership with Cullen. Part of the agreement into which they mutually entered was, that each of them should alternately pass a winter at some large medical school, while the other remained in charge of the business in the country. Hunter visited London in 1741, where he resided with Smellie, the celebrated accoucheur, and studied anatomy under Dr. Nicholls, and surgery at St. George's Hospital. Dr. Douglas, to whom he brought a letter of introduction, engaged him soon after his arrival to assist him in completing an anatomical work which he was publishing, and to educate his son. He resided in the family till 1744, when, Mr. Sharpe having resigned a lectureship on surgery to a Society of Naval Surgeons, Hunter was elected to fill his place, and at once met with the most marked success. In 1746 he commenced lecturing on anatomy, and in 1747 became a member of the Corporation of Surgeons. But he had always preferred the practice of midwifery to that of surgery, and, several circumstances coinciding to give a favourable prospect of success, he determined in 1749 to confine himself exclusively to the former branch of the profession. In 1750 he took a Doctor's degree at Glasgow; in 1764 was appointed physician extraordinary to the queen; in 1767 he became a Fellow of the Royal Society. His time was now so completely occupied in the practice of his profession, that he was obliged to give up a part of his lectures, and his brother John, Hewson, and Cruickshank were successively his partners. He amassed a large fortune, and died in 1783, with a reputation inferior only to that of his brother, of whom it was not his least honour that he had been the preceptor and first patron.

William Hunter's principal work was the 'Anatomy of the Gravid Uterus,' on which he was engaged for nearly thirty years. It contains thirty-four folio plates, most accurately and beautifully engraved from dissections by himself and his brother, illustrative of the most important subjects in obstetrics. He was also the author of numerous essays in the 'Philosophical Transactions,' and the 'Medical Observations.' He founded a medical school in a private house in Windmill Street, with a museum and dissecting rooms attached to it. His valuable museum he bequeathed to Dr. Baillie, who was to hold it for 30 years, and then to transmit it to the university of Glasgow, to which he left 8000*l.* for its maintenance and increase.

HUNTER, JOHN, was born in 1728, at Long-Calderwood, a village near Glasgow, where his father possessed a small farm. Being the youngest of ten children, and his father dying when he was very young, his education was almost entirely neglected. His whole time was devoted to the amusements of the country till he was 17 years old, when he went to stay with his brother-in-law Mr. Buchanan, who was a cabinet-maker at Glasgow. Hunter worked at the trade for nearly three years. At the end of that time, hearing of the great success which his brother [HUNTER, WILLIAM] had met with in London as an anatomical and surgical lecturer, he wrote to offer him his services as assistant in the dissecting-rooms. His offer was accepted, and in 1748 he commenced his anatomical studies, in which he at once distinguished himself both by his ardour and his skill. In 1749 Hunter became the pupil of Cheselden, then surgeon to Chelsea Hospital, where he attended for nearly two years, and in 1751 he went to St. Bartholomew's Hospital, and attended the practice of Mr. Pott. In 1753 he entered as a gentleman-commoner at St. Mary's Hall, Oxford, intending to practise as a physician: but he seems soon after to have given up this idea, for in 1754 he entered as a surgeon's pupil at St. George's Hospital, in the hope of becoming at some future time a surgeon at that institution. In the same year his brother made him his partner in the school, and he delivered a part of each annual course of lectures till 1759, when his constant and severe labours in anatomy, to which he had lately added comparative anatomy and physiology, began to affect his health so seriously that it became advisable for him to resort to some milder climate. With this view he obtained an appointment as staff-surgeon, and early in 1761 proceeded to Belle-Isle with the armament ordered to lay siege to that town. He afterwards went to Spain, and remained in active duty till the end of 1763, when a peace was negotiated, and, his health being completely restored, he returned to London, and commenced practice.

At first Hunter met with little success in his profession. His manners were rough, and he paid but little attention to his practice, regarding it only as a source from which he might obtain the means of carrying on the scientific investigations to which he was far more attached, and which he had steadily pursued while in the army. To defray the expenses which these entailed, he again commenced lecturing on anatomy and surgery; but, notwithstanding the talent and extensive knowledge which his lectures evince, they were little appreciated, and he never had a class of more than twenty pupils. Every year however added to his reputation, and in 1767 he was elected a Fellow of the Royal Society, and in 1768 surgeon to St. George's Hospital. The latter appointment was of the greatest value to him; it increased his income, both by adding to his surgical reputation, and by enabling him to take pupils, from whom he received large fees. Among his pupils was Jenner, with whom he remained throughout his life on terms of the closest intimacy, and Sir Everard Home, whose sister he afterwards married. From the time of his appointment to St George's, Hunter's life was occupied with a constant and laborious investigation of every branch of natural history and comparative anatomy, physiology, and pathology, to all of which he devoted every hour that he could snatch from the requirements of an increasing surgical practice. In 177 he suffered from the first attack of the disease the heart of which he ultimately died. For many years after however his health seemed pretty good, and he was subject to slighter returns of th

disease only when much excited or fatigued; but in 1785 the attacks became more frequent, and he was obliged to leave London. In the following years he became gradually more debilitated, and the slightest fit of anger was sufficient to induce severe spasms. In October 1793, he was engaged in warm disputes with his colleagues at the hospital; and a remark being made by one of them at a meeting of the governors, which Hunter regarded as an insult, he left the room that he might repress or at least conceal his rage, and had scarcely entered the adjoining apartment when he fell dead in the arms of Dr. Robertson, one of the physicians of the hospital.

John Hunter's museum consisted, at the time of his death, of upwards of 10,000 preparations, illustrative of human and comparative anatomy, physiology and pathology, and natural history. The principal and most valuable part of the collection, forming the physiological series, consisted of dissections of the organs of plants and animals, classed according to their different vital functions. He had a beautiful collection of nearly 1000 skeletons; of objects illustrative of natural history, consisting of animals and plants preserved in spirit or stuffed, of which he left nearly 3000; of upwards of 1200 fossils; and of monsters. The pathological part of the museum contained about 2500 specimens, arranged in three principal departments: the first illustrating the processes of common diseases and the actions of restoration; the second the effects of specific diseases; and the third the effects of various diseases arranged according to their locality in the body. Appended to these was a collection of about 700 calculi and other inorganic concretions. The museum was sold after Hunter's death. The government gave 15,000*l.* for it, and presented it to the College of Surgeons, London, by whom it has been greatly augmented and maintained.

For several years before his death Hunter had been anxious to form a complete catalogue of his collection, and to embody in one large work the results of all his labours and observations. He died when he had completed but a small portion of his design, and left only the materials with which his successors might have completed a work which would undoubtedly have been the most valuable of its kind ever published. The formation of the catalogue was intrusted to Sir Everard Home, the brother-in-law and only surviving executor of Hunter, but from year to year he deferred his task, and, after supplying only two small portions of his undertaking, he at length announced, that in accordance with a wish which he had heard Mr. Hunter express, he had burned the manuscripts, which he had taken without leave from the College of Surgeons, and among which were the ten volumes of dissections, and numerous other original papers. The Catalogue however is now formed in a manner which, although it cannot compensate for the loss of the other, confers the highest credit on those by whom it has been made.

Hunter is, by the common consent of all his successors, the greatest man that ever practised surgery. Considered merely as a surgeon, and with reference only to the direct improvements which he effected in its practice, he stands inferior to few: his improvement of the operation for aneurism was undoubtedly the most brilliant discovery in surgery of his century. He first described the important disease of inflammation of the veins; he first published lucid views on the venereal disease, and by his work on inflammation improved the modes of practice applicable to nine-tenths of the diseases which fall within the province of the surgeon. But it was less by individual discoveries than by the general tone of scientific investigation which he gave to surgical practice that he made it a science, rather than a mechanical art, and induced men of far higher attainments than those who had before practised it to make it their study.

As an anatomist and physiologist, his museum alone is sufficient to show that he has had no superior; and while his published works confirm this opinion, and exhibit what he knew, they add to the regret that so much more should have been lost.

His surgical works were published about ten years ago, 'John Hunter's Surgical Works, with Life, by Palmer,' 4 vols. 8vo.

HUNTINGDON. [HUNTINGDONSHIRE.]

HUNTINGDON, SELINA, COUNTESS OF, born 1707, died 1791, was one of the three daughters and co-heirs of Washington Shirley, Earl Ferrers. She married, in 1728, Theophilus Hastings, earl of Huntingdon, who died Oct. 13, 1746. She had many children, four of whom died in youth or early manhood. She became deeply religious, and may be said to belong to the Whitfieldian section of Methodism; but she chose to act herself as the founder of a sect. Her followers are distinguished as belonging to 'the Countess of Huntingdon's connexion.'

HUNTINGDONSHIRE, an inland county of England, situated between 52° 8′ and 52° 36′ N. lat., and 0° 3′ E. long. and 0° 30′ W. long. It is bounded N. and N.W. by Northamptonshire, S.W. by Bedfordshire, and on all other sides by Cambridgeshire. The area is 372 square miles, or 238,080 acres. The population in 1841 was 58,549.

Surface, Rivers, &c.—Huntingdonshire has no high hills, but there are two or three elevated tracts. The principal rivers are the Ouse and the Nene, with their respective tributaries. The Ouse enters the county from Bedfordshire near St. Neots, and, flowing past Huntingdon, enters Cambridgeshire at Earith, after a course of about 23 miles in the county or on the borders, all navigable. The Nene has a short course along the northern border before it enters Cambridgeshire. Whittlesea-Mere, Ramsey-Mere, and Ugg-Mere are large pools or lakes. A considerable part of the county is destitute of springs, and is supplied with water from ponds.

The high north road enters this county on the south-east side. A railroad from Cambridge passes by St. Ives to Huntingdon.

Geology, Climate, and Agriculture.—The south-eastern part of the county is occupied by the iron-sand and gault. The rest of the county, ex-

cepting the Fens, and perhaps a narrow strip on the western side, is occupied by the Oxford clay.

The climate is similar to that of the contiguous inland counties. The low and flat districts, which are principally fens, are subject to fogs. Only a small portion of the county is unproductive. The soil varies considerably, but clay predominates. Peat is found in many parts. The water is principally supplied from rivers, ponds, and wells. The farms are mostly of considerable extent. The expense of cultivation on the fen-land, when it is first drained, is small in proportion to the produce. Paring and burning the surface is the general practice. Rape seed is sown, which is fed off with sheep the first year, and left to ripen its seeds the next. The straw of the rape is burned on the land, after the seed has been thrashed out; and this is all the manure required to produce a good crop of wheat. Where the soil is wet and heavy, oats are substituted for wheat. The next crop is beans, which are sown, or drilled, after a good dressing with dung, and with a deeper ploughing. The next crop is barley with grass seeds. The land is then pared and burnt again, and the same rotation repeated. Mustard-seed is grown to some extent in this county, and in good soils gives a good return. On the borders of the Ouse and Nene are some very rich meadows, but there is not a sufficient supply of running water to form artificial water-meadows. The grass is coarse naturally, but by close feeding with sheep in summer its quality is much improved.

A great part of the county is still in pasture, although much has been broken up and converted into arable land. The county of Huntingdon is rather bare of trees. In the marshy parts willows grow rapidly, and are profitable, although not ornamental. Horses are invariably used for the plough. The cows kept for the dairy are mostly of the Yorkshire or Durham breed of short-horns.

Although Stilton is in this county, and it is asserted that the cheese which bears that name was originally made there, none of that kind is now produced in any of the dairies; all such cheeses are made in Leicestershire or Lincolnshire. The sheep are mostly of the Leicester breed. The hogs are Berkshire or Leicestershire, with various crosses.

Divisions and Towns.—Huntingdonshire is divided into 4 hundreds. It is in the diocese of Lincoln. It is in the Norfolk circuit. The assizes are held at Huntingdon. Two members are returned to parliament for the county, and two for Huntingdon.

Godmanchester is 2 miles S.E. from Huntingdon. It was for many centuries famed for the goodness of its husbandry. The place was early incorporated, and under the Municipal Corporations Reform Act is governed by 4 aldermen and 12 councillors. The parish, which forms part of the parliamentary borough of Huntingdon, contains a population of 2152.

Huntingdon, the chief town of Huntingdonshire, and a municipal and parliamentary borough, is 59 miles from London by the road, or 77 by the Eastern Counties Railway. The town is on a gently rising ground on the north bank of the Ouse, and is connected with Godmanchester by a causeway across the meadows. The principal street extends about a mile north-west from the bridge over the Ouse, and consists for the most part of respectable houses; it is lighted with gas. St. Mary's Church is of perpendicular character; it was rebuilt in A.D. 1620, but is much mutilated. All Saints has a fine perpendicular tower, with a good entrance. The town-hall is a good brick building stuccoed. There is a new county gaol and house of correction, and a borough gaol. The trade of the town is considerable, principally in wool and corn; the market is well supplied with corn and provisions. Huntingdon has a small theatre, a race-course, two or three reading societies, a horticultural society, an endowed grammar school, and other educational establishments. The municipal borough is governed by 4 aldermen and 12 councillors: population, 3507. The parliamentary borough returns 2 members to the House of Commons. Population, 5500.

Kimbolton is 9 miles S.W. from Huntingdon. The town is small and unimportant. The church has a tower with a lofty spire. There is an endowed grammar school. Population, 1634.

Ramsey is 8 miles N.N.E. from Huntingdon. The town derives its origin from a Benedictine abbey, founded on an island or dry spot in the marshes, called Ram's Ey, *i. e.* Ram's island, in the reign of Edgar, A.D. 969. It consists chiefly of one long street. The church is spacious. Population of the parish, which extends into Cambridgeshire, 3680.

St. Ives is 5 miles E. by S. from Huntingdon. The town stands on a slope; the lower part, close on the bank of the Ouse, is liable to be inundated by the floods of that river. The streets are well paved and lighted, and in the outskirts of the town are some good houses. Brewing and malting are carried on, but there are no manufactures. Considerable business is done by means of the navigation of the Ouse. The market is one of the largest in the kingdom for cattle. The church is a light neat building, with some ancient portions. Population, 3514.

St. Neots is 8 miles S.S.W. from Huntingdon. A Benedictine monastery was early established here, to which the remains, or part of the remains, of Neot, a Saxon saint, were transferred from Neotstock in Cornwall. The town is of respectable appearance. The church is a remarkably fine edifice. Population of the parish, 3123.

Stilton is 11 miles N.N.W. from Huntingdon. Stilton was once a market-town, but has dwindled into insignificance. The Stilton cheese takes its name from this village, but no cheese of that kind is now made there. Population of the parish, 817.

Yaxley is 12¼ miles N. from Huntingdon. The town is small and irregularly laid out. The church is a fine edifice, built partly in the perpendicular style, intermixed with others of an earlier date. Population of the parish, 1211.

History and Antiquities. — Huntingdonshire is generally considered to have formed part of the territories of the Iceni, but it must at least have been on the western frontier of that nation,

towards the Catyeuchlani. Upon the subjugation of Britain by the Romans, it was included in the province of Flavia Cæsariensis. Two Roman stations are considered to have been in this county. The Roman Ermin Street crossed the county, from S. by E. to N. by W. The Via Devana crossed the county, from near Cambridge to Leicester.

In the earlier part of the Saxon period this county was included in the kingdom of the East Angles. It was subsequently annexed to Mercia. In the latter period of the Anglo-Saxon dynasty it constituted an earldom, which continued till 1789, when it was supposed to have become extinct; but, a claimant having made out a good title in 1819, it was revived, and still exists.

In the civil wars of Charles I. Huntingdon was plundered in 1645, by the royalists. This town was the birth-place of Oliver Cromwell.

Of the churches, Alwalton, Conington, Hartford, and Leighton Bromswold have some portions of Norman architecture. The tower of Chesterton church is a good specimen of early English, with a fine spire. Upton and Wootton churches have also some fine portions of early English architecture.

HUNTINGTON, ROBERT, D.D., was born in February 1636, at Deerhurst, in Gloucestershire, where his father was parish clergyman. He was admitted in 1652 a portionist of Merton College, Oxford; and, having taken his bachelor's degree in 1658, he was soon after elected to a fellowship. He took his degree of Master of Arts in 1663; and, having then applied himself with great success to the study of the Oriental languages, he was in 1670 appointed to the situation of chaplain to the English factory at Aleppo. This post he held for above eleven years. In the latter part of 1682 he was prevailed upon to accept the place of provost or master of Trinity College, Dublin; but he resigned it in 1691. In August 1692, he was presented to the rectory of Great Hallingbury in Essex; and while here he married a sister of Sir John Powell, one of the justices of the King's Bench. In 1701 he accepted the bishopric of Raphoe in Ireland; and he died there, Sept. 2, in the same year. The only literary performance that Bishop Huntington published was a short paper in the 'Philosophical Transactions' (No. 161), entitled 'A Letter from Dublin concerning the Porphyry Pillars in Egypt.' Dr. Huntington is principally remembered for the numerous Oriental manuscripts which he procured while in the East and brought with him to this country.

HUNTLEY. [Aberdeenshire.]

HUNTSVILLE. [Alabama.]

HURA, a genus of plants belonging to the natural order *Euphorbiaceæ*. *H. crepitans* is a tree abounding with milky juice. It is a native of the West-Indian Islands, Mexico, and Guyana; where it is called Monkey's Dinner-Bell. The fruit of this tree is a depressed woody capsule, about the size of a middling apple, with from 12 to 18 furrows which separate into as many cocci; each of these separates into 2 valves, and flies asunder with great elasticity when dry and fully ripe. The noise the fruit makes during this process has obtained for the tree its common name. The juice of the plant is exceedingly acrid, and a small quantity touching the eye will produce blindness. The seeds contain an acrid oil which is a drastic and dangerous cathartic.

HURD, RICHARD, D.D., was born in 1720, and died bishop of Worcester in 1808. He went to Cambridge at a much earlier age than is now the custom, about fifteen; and his history from that time is that of a scholar, university man, author, and divine. The writings of Bishop Hurd are too many to be particularly named. The most remarkable are his 'Dialogues,' his 'Letters on Romance and Chivalry,' his 'English Commentary on the Epistle of Horace on the Art of Poetry,' and the ingenious Essays published with it, his 'Twelve Discourses on the Prophecies,' his 'Sermons,' and his Life of his friend Bishop Warburton. There is also an octavo volume of the correspondence between Warburton and Hurd, a very pleasing book.

HURDIS, JAMES, was born at Bishopstone, in Sussex, in 1763. In 1780 he entered at St. Mary Hall, Oxford, and was subsequently elected demy and fellow of Magdalen College, and took orders. In 1788 he published 'The Village Curate,' a poem in blank verse. This was followed by a tragedy, called 'Sir Thomas More,' and some other poetical works, as well as by two theological critiques on Genesis, and 'Remarks on the Arrangement of the Plays of Shakspeare.' In 1793 he was elected professor of poetry in the university of Oxford, and in 1801 he died.

HURON, LAKE. [Canada.]

HURRAR, called also *Harrar* and *Adhari*, is a country with a large commercial town in the eastern part of Africa, and situated between Ankóber, the capital of Shoa, and the harbour of Burburah. As the place has not been visited by Europeans, its precise situation is not known. (Barker, *Report on the probable Geographical Position of Hurrar*, in the *London Geographical Journal*, vol. xii.)

HUSBAND. [Wife.]

HUSBANDRY. In the oldest writings which have been handed down to us, the common operations of husbandry are mentioned, or alluded to, under the Greeks and Romans, in nearly the same terms in which we should describe them now. Considerable progress had been made in the tillage of the ground and in the breeding and rearing of the domestic animals. The practice of fallowing land, to restore its fertility, can be clearly traced to them. The colonies planted by the Greeks and Romans tended to diffuse a knowledge of husbandry among ruder nations.

The land in England consisted originally for the most part of woods, and of extensive pastures, in which sheep and cattle were bred, which constituted the chief wealth. A very small proportion of the soil was cultivated; and, while the population was thin, there was no difficulty in obtaining land which had never before been broken up, and which with little trouble or manuring produced moderate crops of corn. When the husbandmen began to congregate in villages for mutual defence, the best land nearest to the habitations was culti-

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vated, and the common pastures fed the cattle without much trouble or expense. Manure was seldom made; four times the seed was an average corn crop; and fields were fallowed every second year. Wheat was little cultivated; barley, rye, and oats were the principal produce. Many hogs were fed on acorns and beech-mast in the woods. Bread made of rye, barley, peas, or beans, was the food of the labourers who were attached to the soil. The immediate tenants of the lord cultivated a portion of the lands which they held for their own use, and let the remainder to smaller tenants, who, although born free, were little above the condition of the labourers, and lived much in the same manner. The live stock was frequently hired from the landlord. Oxen drew the ploughs; horses carried the produce to mill and market; and the implements were of the rudest kind.

The first English author of any note who wrote on husbandry was Sir Antony Fitzherbert, in 1523. The farmer of those days was a hard-working man. Money was seldom seen in his possession. He lived on the produce of his land, and fed his labourers at his own board. Wool was the principal article sold. The sheep were kept on extensive commons at little expense. The great difficulty was to keep them alive in severe winters, and many perished every year.

In the time of Elizabeth some attention began to be paid to the improvement of husbandry; the situation of the farmers appears to have improved; they began to acquire wealth and to increase their domestic comforts.

Cromwell encouraged husbandry; and works on husbandry published by Hartlib, Bligh, and Weston, introduced many improvements in the seventeenth century. From that time to the present day husbandry has improved slowly but regularly. With the increase of population, and a consequent increased demand for the produce of the soil, the cultivation of waste lands, and the granting of long leases to farmers, were resorted to with the best results. Jethro Tull, a gentleman who had a property near Hungerford in Berkshire, introduced a mode of cultivation which was prevalent in Lombardy, and was borrowed from the practice of gardeners, who sow and plant their vegetables in rows with wide intervals. Finding that in rich soils the produce was much increased by stirring the earth round the roots of plants, he formed a theory respecting the food of plants, which he imagined to be extremely attenuated earth. His theory was false; but the introduction of machines to drill the seed in rows, and of others to clean and hoe the intervals, which he principally suggested, has been of infinite use to the improved cultivation of the soil.

The rearing and fattening of cattle on the produce of arable land, which followed the introduction of sainfoin, lucern, and other artificial grasses, and the cultivation of roots for the same purpose, have made a great change in the old systems. Manure is produced in greater quantity; the land is increased in productive power, and will bear more frequent crops of corn; better implements have been invented to save labour and do the work more completely; and good systems of draining have been introduced. The improvements which have been made in the breeds of cattle and sheep may be considered as entirely modern.

To enumerate the various works which have come from the press on subjects connected with husbandry would be to give a catalogue of a large library. We can only mention some of the principal authors, such as Lord Kames, Marshall, Arthur Young, Sir John Sinclair, Dickson, and the late Rev. W. Rham. The 'Farmer's Magazine,' which appeared in 1800, has done much good in disseminating useful practices in husbandry; and later journals, some issued by agricultural societies, have continued to impart similar benefits.

Different systems of husbandry have been prevalent at different times and in different parts of Great Britain.

The first and most inartificial is that which consists in breaking up portions of pasture-land and sowing corn on a slight ploughing, which cannot fail to be productive for some time. Several crops may thus be taken, until the land is so exhausted that the crop no longer repays the seed and labour. To extend this time, experience soon pointed out the crops which succeeded best after each other. Wheat or barley were probably the first crops; afterwards peas, beans, or oats, until the ground, being overrun with weeds, would be left to the renovating effect of time, and a fresh spot would be broken up.

The first improvement on this system is that of infield and outfield. The infield is cultivated more carefully, somewhat like a garden, and all the dung of the cattle is exclusively put upon this part. The outfield is a continuation of the first-mentioned system. The infield consisted of inclosures or open fields near the dwelling, which it was most convenient to cultivate as arable land.

The mode of recruiting lands which have been exhausted by crops or were overrun with weeds by means of a fallow, seems to have been introduced into England by the Romans. The alternate crop and fallow seem to have been later introduced than a fallow after several crops. The triennial system, which consists of a summer fallow, a winter crop, and a spring crop, was probably longer established than any other, and is still the practice in many parts of England.

When common fields are divided and inclosed, a better system of husbandry generally follows. Clover and turnips are more regularly sown, and on the light lands, take the place of summer fallow. Clover generally comes after a crop of corn, with which it was sown the preceding year in spring, and, as most crops succeed well after clover, wheat was usually chosen for the next crop, as the most profitable. Thus arose the Norfolk (or alternate) system, without any very sudden departure from the old rotations. These changes, and the introduction of beans into the series, gave rise to the improved rotation of turnips, barley, clover, wheat, beans, wheat; after which the land is again cleaned and prepared for turnips with all the manure that can be spared.

As the English systems have taken their orig

chiefly from the infield cultivation, so the Scotch appear to have arisen from that of the outfield. Fallows were unknown; but the sowing of grass-seed gave rise to the Scotch convertible system of husbandry, which is gaining ground daily, and bids fair, in remote situations where no manure can be purchased, to be firmly established. The convertible system is not very generally known or adopted in England, and is often confounded with the alternate system. The alternate system interposes a green crop between two white straw crops. On good land the convertible husbandry may consist of three or four years' tillage and three years' grass.

What renders the improved systems of British husbandry so superior to that of all other nations is the attention paid to the perfection of the different breeds of domestic animals, especially the horse, the ox, and the sheep. In this respect British husbandry surpasses every other. No expense or trouble is spared to improve the qualities of cattle and sheep.

The great variety of new instruments which are daily invented, and some of which gradually come into use, however expensive they may appear, is another feature in British husbandry; and the letting out of drills and thrashing machines, which are kept for profit by men who have little or no land to cultivate, is a step to that division of labour which has done such wonders in manufacturing industry, and which will no doubt in time do the same in the operations of husbandry.

HUSKISSON, WILLIAM, was born March 11, 1770, at Birch Moreton Court, Worcestershire, where his father occupied an extensive farm. The family had long been settled in Staffordshire, in possession of a moderate landed estate. The entailed property descended to the subject of the present notice, who cut off the entail and disposed of the landed property altogether.

In 1783, when in his fourteenth year, William Huskisson was sent to Paris, and became an enthusiast in the cause of the French Revolution. He was present at the taking of the Bastile in 1789, and became a member of one of the French clubs, from which however he soon withdrew. In the following year (1790) he became private secretary to Lord Gower (afterwards the Marquis of Stafford), who was then the English ambassador. After the events of the 10th of August, 1792, the English ambassador was recalled, and Mr. Huskisson returned with him to England. In January 1793, by desire of Mr. Dundas, he undertook the duties of a small office which had just been created for investigating the claims of French emigrants who were then thronging in crowds to England. Early in 1795 he was appointed under-secretary of state in the department of War and Colonies under Mr. Dundas. Towards the end of 1796 he was brought into parliament as member for Morpeth. On the retirement of Mr. Pitt, he resigned his official situation. He was unsuccessful in procuring a seat at the general election in 1802, and did not appear again in parliament until 1804, when he sat for Liskeard. He was secretary of the Treasury under the administration formed by Mr. Pitt in 1804, and, after the death of that minister, was an active member of the opposition. At the general election in 1806 he was re-elected for Liskeard, and after the dissolution of parliament in 1807 he sat for Harwich, and continued to do so until 1812. From this period until 1823 he represented Chichester, in which neighbourhood he had, in 1801, purchased a small estate. From 1823 until his death he represented Liverpool.

On the retirement of the Whigs from office, in 1807, Mr. Huskisson resumed his former post as secretary of the Treasury. He resigned office in 1809, along with Mr. Canning. In August 1814, he was appointed Chief Commissioner of Woods and Forests. In 1823 he was made President of the Board of Trade, Treasurer of the Navy, and a cabinet minister. After the death of Mr. Canning, in 1827, Mr. Huskisson held the office of Secretary for the Colonies in Lord Goderich's cabinet; and he retained his post when this cabinet was broken up and the Duke of Wellington became the head of a new ministry. On the 19th of May, 1829, the debate on the disfranchisement of East Retford took an unexpected turn, and Mr. Huskisson was called upon to redeem a pledge which he had given in a former discussion on the question; and he accordingly voted in favour of the bill and in opposition to his colleagues. After the debate, at 2 A.M. he wrote a note to the Duke of Wellington, placing his resignation in his hands. Without any communication with Mr. Huskisson, the duke laid it before the king. The resignation of Mr. Huskisson was followed by that of Lord Palmerston, Mr. Grant, and several others who had belonged to what was called 'Mr. Canning's party.'

At the close of the session of 1830, Mr. Huskisson left London to be present at the opening of the Liverpool and Manchester Railway, on the 15th of September. At Parkside, near Newton, Mr. Huskisson, with others, had got out of the carriage, when an alarm was given of the approach of an engine on the other line. Mr. Huskisson attempted to regain his seat, but fell at the moment when the engine passed, and was so much injured that he died the same evening.

Mr. Huskisson married in 1799 the youngest daughter of Admiral Milbanke, but had no family. On retiring from office in 1829, he entered upon the receipt of one of six pensions of 3000*l.* a year, which the Crown was empowered to grant for long public services.

Mr. Huskisson seldom spoke in the House of Commons except on financial and commercial subjects. He was an active member of the Bullion Committee. He advocated the principles of free trade on many occasions with much ability.

HUSS, JOHN, was born at Hussinatz, a village of Bohemia, of humble parents, about 1370. He studied in the university of Prague. Being ordained priest in 1400, he adopted the opinions of Wycliffe, and gave offence to the Archbishop of Prague; but Huss was confessor to Sophia, queen of Bohemia, and was favoured by King Wenceslaus himself, and thus he was able to

maintain his ground. In 1408 the heads of the university declared that whoever taught the opinions of Wycliffe should be expelled from that body. Huss identified his cause with that of his Bohemian countrymen, and the consequence was that the German students withdrew from the university and repaired to Leipzig. Huss afterwards became rector of the university of Prague, and inculcated the doctrines of Wycliffe, whose works he caused to be translated into Bohemian. The Archbishop of Prague ordered them to be publicly burned, and excommunicated those who adhered to the opinions contained in them. He also suspended Huss from his sacerdotal functions, but Huss assembled the people, and preached against the Pope, against purgatory, and above all against indulgences. He was then summoned by the Pope, John XXIII., to appear at Bologna to answer the charges against him, which neglecting to do, he was excommunicated. Huss however had a strong party in his favour, and, unwilling to encourage the disorders which arose, he retired to his native village. Some time after, on the death of the archbishop, Huss returned to Prague, and there publicly opposed a papal bull which had been just issued by the court of Rome against Ladislaus, king of Naples. Fresh tumults took place; Huss was cited to appear before the Council of Constance, and he obeyed in 1414, after receiving a safe conduct from the Emperor Sigismund. On arriving at Constance however, he was arrested. His doctrines were condemned as heretical, and he was burnt. [CONSTANCE, COUNCIL OF.]

HUTCHESON, FRANCIS, was born in Ireland, Aug. 8, 1694. His father was a Presbyterian minister. After completing his studies at Glasgow, Hutcheson officiated for some time as minister to a Presbyterian congregation in the north of Ireland. In 1720 he first became known by the publication of his 'Inquiry into the Original of our Ideas of Beauty and Virtue, &c., with an attempt to introduce a mathematical calculation in subjects of morality.' His essay, 'On the Nature and Conduct of the Passions and Affections,' appeared in 1728, and in the following year he was appointed professor of moral philosophy in the university of Glasgow, where he was admitted to the degree of LL.D. His largest work, in 2 vols. 4to., entitled 'System of Moral Philosophy,' did not appear until after his death, which took place at Glasgow in 1747.

HUTCHINSON, JOHN, was born in 1674, at Spennithorne in Yorkshire. He received a good education, and he became steward to the Duke of Somerset. Availing himself of the opportunities which his situation afforded him, he made a large and valuable collection of fossils, which, with his own observations, he consigned to the care of Dr. Woodward to digest and publish. This duty Woodward failed to discharge, but bequeathed the task and the collection to the University of Cambridge. In 1724 Hutchinson published the first part of a curious work entitled 'Moses's Principia,' in which he attempted to refute the doctrine of gravitation as taught in the 'Principia' of Newton. In the second part of this work, which appeared in 1727, he continued his attack upon the Newtonian philosophy. From this time to his death he published yearly one or two volumes in further elucidation of his views, which tend to show that the Old Testament contains a complete system of natural history, theology, and religion. They are written in a rambling and uncouth style, but evince a profound and extensive knowledge of the Hebrew scriptures. He died on the 28th of August, 1737.

HUTCHINSONIANS, the denomination of those who followed the philological and exegetical views of John Hutchinson. In their number they reckoned several distinguished divines in England and Scotland, both of the established church and of dissenting communities.

HUTTON, WILLIAM, was born at Derby, of poor parents, September 30th, 1723. At the age of seven he was sent by his father to work in the silk-mill at Derby, which occupation he quitted at seventeen, and was bound apprentice to an uncle at Nottingham, who was a stocking-maker. He ran away during his apprenticeship, and wandered as far as Birmingham, but distress compelled him to return to his uncle. In 1746 he taught himself the art of bookbinding, walked to London to purchase a few bookbinders' tools, and in the year 1749 commenced attending Southwell, fourteen miles distant from Nottingham, on the market-day; and here he rented a shop at twenty shillings a year, and opened it for the sale of books. His object was to save a small sum to enable him to commence business in a large town and in 1750 he took the lesser half of a small shop in Birmingham, at a rent of one shilling per week, and furnished it with a small supply of books. Five shillings a week covered all his expenses, and at the end of the first year he had saved 20*l*. Fortune continued to smile upon him and in 1755 he married. In 1791 his property was destroyed during the Church and King Riots at Birmingham in that year, but after great difficulty he succeeded in recovering 5390*l*. from the county. He now relinquished business in favour of his son. He had filled successively all the local offices of the town. In 1781 he published his 'History of Birmingham;' and this was followed by other works, of which the principal were—'Journey to London,' 1784; 'The Court of Requests,' 1784; 'The Hundred Court,' 1787; 'History of Derby,' 1790; 'The Roman Wall,' 1801.

Mr. Hutton died September 20th, 1815, a few days before the completion of his 92nd year. In 1816 his daughter published 'The Life of William Hutton, Stationer, of Birmingham, and the History of his Family: written by Himself.' A new edition of this work was published in 1841 in the series of 'Knight's English Miscellanies.'

HUTTON, CHARLES, was born at Newcastle-upon-Tyne, on the 14th of August, 1737. He manifested at an early period an extraordinary predilection for mathematical studies, and while yet at school he is said to have made considerable progress with little or no aid from his masters. Upon the death of his father, which happened before he had completed his eighteenth year,

became teacher in a school at the neighbouring village of Jesmond, and some years afterwards his master, who was a clergyman, having been presented to a living, resigned the school in his favour. In 1760 Hutton married, and removed his establishment to Newcastle, where he met with considerable encouragement. While engaged in tuition, he wrote his first work, entitled 'A Practical Treatise on Arithmetic and Bookkeeping,' which appeared in 1764, and soon passed through several editions. In 1771 he published his 'Treatise on Mensuration,' 4to., Lond., and the same year, the bridge of Newcastle having been nearly destroyed by a great flood, he drew up a paper upon the best means of securing its future stability, which was afterwards published under the title of 'Principles of Bridges and the Mathematical Demonstration of the Laws of Arches,' Newcastle, 8vo., 1772. In 1773 he became a candidate for the professorship of mathematics at the Royal Military Academy of Woolwich, and obtained the place after a severe competition. Hutton was elected a fellow of the Royal Society, and, upon the accession of Sir John Pringle to the presidency, he was appointed foreign secretary to that body, which office he continued to hold with the greatest credit until he was displaced by Sir Joseph Banks in 1778-9, on the plea that it was requisite the secretary should reside constantly in London. In 1775 the Royal Society instituted a series of experiments on the mountain Schehallien in Perthshire, with a view to determine the mean density of the earth. These were conducted principally under the direction of Dr. Maskelyne, and when completed the labour of making the necessary calculations was allotted to Dr. Hutton, who was considered the most competent person for the undertaking. His report is contained in the 'Philosophical Transactions' of the year 1778. In the year 1779 the degree of LL.D. was conferred upon him by the University of Edinburgh. In 1781 he published his 'Tables of the Product and Power of Numbers,' Lond., 8vo., and in 1785 his 'Mathematical Tables,' containing the common, hyperbolic, and logistic logarithms, with the sines, tangents, &c., both natural and logarithmic, Lond., 8vo. To these succeeded his 'Tracts on Mathematical and Philosophical Subjects,' in 4to., Lond., 1786, which were reprinted in 1812, Lond., 8vo., 3 vols. In 1795 appeared his 'Mathematical and Philosophical Dictionary,' in two large quarto volumes, which has since supplied all subsequent works of that description with valuable information both in the sciences treated of and in scientific biography.

About this time he undertook, in conjunction with Drs. Pearson and Shaw, the arduous task of abridging the 'Philosophical Transactions.' The work was completed in 1809, in 18 volumes quarto. In 1806 he was attacked by a pulmonary complaint, which a few years after led to his retirement from the academy. Dr. Hutton died Jan. 27, 1823, in the 86th year of his age.

Besides the works above mentioned, and the papers in the 'Transactions of the Royal Society,' Dr. Hutton was a constant contributor to the 'Lady's Diary,' of which periodical he was editor for many years. His remaining works consist of—'Elements of Conic Sections,' 1787, 8vo.; 'A Course of Mathematics, designed for the use of Cadets in the Royal Military Academy,' London, 1798-1801, 3 vols., of which several later editions have appeared; 'Recreations in Mathematics and Natural Philosophy, from the French of Montucla,' London, 1803, 4 vols. 8vo., and some others.

HUVEAUNE, River. [BOUCHES-DU-RHONE.]

HUYGHENS, CHRISTIAN, son of Constantine Huyghens, possessor of Zulichem, Zelhem, &c., in Holland; whence Huyghens (Latinised *Hugenius*) is often called Zulichemius, though his inheritance was the second-named estate, and the initials C. H. à Z., or C. H. D. Z., often appear on the titles of his works.

Christian Huyghens was born at the Hague, April 14, 1629. His father had been secretary to three Princes of Orange. The subject of this article, his second son, from his boyhood showed an aptitude for mathematical and mechanical studies, and in 1645 he prosecuted them at the university of Leyden. In 1646-48 he studied civil law at Breda. In 1649 he accompanied a count of Nassau to Denmark; and in 1655 he visited France. He then remained in Holland till 1660, when he went again to France, and in 1661 to England, both which voyages he repeated in 1663. In 1665 he was invited to France by Colbert, where he remained from 1666 to 1681, with the exception of two trips to Holland in 1670 and 1675, for health. This consideration prompted his final return to Holland in 1681: he was again in England in 1689, and died at the Hague, June 8, 1695.

The greater part of the works of Huyghens which were published during his lifetime were collected by S'Gravesande, Leyden, 1724, 4 vols. Huyghens left his papers to the university of Leyden. The consequence was a volume entitled 'Christiani Hugenii, &c., Opuscula Posthuma,' 1700. But in 1728 S'Gravesande completed his edition of the works printed by Huyghens himself, and also republished the 'Opuscula Posthuma;' this edition, entitled 'Opera Reliqua,' was printed at Amsterdam. To these two works, which contain almost all that Huyghens wrote, and all that he published, with the exception of papers in the 'Philosophical Transactions' and other periodicals, we must add the mention of his correspondence, the publication of which was commenced in 1833, 'Christ. Hugenii aliorumque Exercitationes Mathematicæ et Philosophicæ, ex MSS. in Bibl. Acad., Lugd. Bat., edente P. J. Uylenbroek.'

Huyghens wrote on the quadrature of the hyperbola and on that of the circle. In this last work he gives some new and very close approximations to the quadrature of the circle. He was also engaged in a controversy with James Gregory on this subject.

His 'Horologium,' and 'Horologium Oscillatorium,' appeared in 1673. In the first of these tracts Huyghens simply describes the application of the pendulum to the clock, of which improvement he is the inventor. The idea came to

him in 1656, and the pendulum employed was the common circular one. In the second he describes the well-known but now disused apparatus by which the geometrically isochronous or cycloidal pendulum was obtained. But this is the least part of the celebrated work before us, which contains four distinct and new discoveries of first-rate importance. The first is that of the cycloid being the curve all whose arcs measured from the lowest point are synchronous. The second is the invention of the involution and evolution of curves, in which the proposition is established that the cycloid is its own evolute. The third is the method of finding the centre of oscillation, being the first successful solution of a dynamical problem, in which connected material points are supposed to act on one another. The fourth is the announcement (without demonstration) of those relations between the centrifugal force and velocity of a body revolving in a circle, which were afterwards proved by Newton in the 'Principia.' It thus appears that Huyghens was in complete possession of the solution of the problem of circular motion. Had his mind not been preoccupied by the Cartesian system, it is most probable that he would have gone at least to the extent of deducing Kepler's laws from the assumption of gravitation.

In the 'Journal des Sçavans,' Feb. 1675, Huyghens described the spring pendulum, such as is now used in watches. Though there can be no doubt that this was an independent invention, yet its priority has been questioned.

Huyghens was one of the first who gave the laws of impact. The Royal Society of London had invited attention to the question, and Huyghens, Wren, and Wallis sent solutions to the Royal Society about the same time (A.D. 1669). There is an extract from his paper in the 'Phil. Trans.' for that year; but the whole paper (perhaps enlarged) appears among the posthumous works.

'De Saturni Lunâ Observatio Nova,' Hag. Com., 1656. This is a tract of two pages printed at the end of Borelli 'De vero Telescopii Inventore.' It announces the discovery of a satellite to Saturn, being that which we now call the fourth. This took place on the 25th day of March, 1665, and Huyghens immediately (as was then common) communicated the following cipher:—'Admovere oculis distantia sidera nostris *v v v v v v c c c r r h m b q x*;' which being transposed will make the following:—'Saturno luna sua circumducitur diebus sexdecim horis quatuor.' In the present tract he explains the enigma, and adds that he is about to publish on the Saturnian system. In the meanwhile he adds another logogryph to substantiate his right to another discovery. It is as follows:—'*a a a a a a a c c c c c d e e e e e g h i i i i i i l l l l m m n n n n n n n n n n o o o o p p q r r s t t t t t u u u u u.*' The explanation of this dark saying was given in the 'Systema Saturnium,' printed at the Hague in 1759. It should be remembered that Galileo's telescopes showed him nothing more as to Saturn than that it appeared to have some lateral appendages which looked like handles. In 1655 Huyghens had applied himself, in conjunction with his elder brother Constantine, to the manufacture of large telescopes. The meaning of the enigma was:—'Annulo cingitur tenui, plano, nusquam cohærente, ad eclipticam inclinato;' that is, he had discovered Saturn's ring. The 'Systema Saturnium' gives an account of the discovery, fixes the position of the ring, and explains the phenomena of its appearance and disappearance, &c.

The 'Cosmotheoros' was passing through the press when Huyghens died. It was printed at the Hague in 1698, and was twice printed in English, first in 1698, and next at Glasgow in 1757; besides several translations into continental languages. It defends the Copernican system, and enters into a large number of speculations on the physical constitution and probable inhabitants of the planets.

In his optical writings Huyghens took up the theory of undulations in opposition to that of emanation, which was adopted by Newton. By this theory he gave a sufficient explanation of the phenomena of reflexion and refraction, and also of that of double refraction, in which Newton could not succeed; that is, he gave an explanation of all the prominent phenomena of optics. The undulatory theory is now almost universally received, and Huyghens must be considered as the founder of it; for, though Hooke had previously advanced the notion, yet he made no application of it to the explanation of phenomena.

It remains to mention the treatise 'De Ratiociniis in Ludo Aleæ,' which was printed at the end of Schooten's 'Exercitationes Mathematicæ' Leyden, 1657. It is the earliest regular treatise on questions of chances, and first points out the manner in which the expectation of a player is determined.

We leave some minor writings unnoticed, referring to the collections of Huyghens's works.

Huyghens is distinguished by correctness, penetration, and a freshness of intellect which never left him. Before he was in possession of the formal differential calculus he was able to supply its place. His power of acquisition lasted to the end of his life. He was near sixty when he read the 'Principia,' and past that age when he began to study the Calculus of Leibnitz. At that time of life persons seldom change old opinions; but Huyghens admitted the theory of Newton instantaneously.

HUYSUM, JAN VAN, was born at Amsterdam, in 1682. The father, a picture-dealer and painter, was the instructor of his son, who soon became celebrated as a flower and fruit painter. His flowers are more beautiful and true to nature than his fruits. He is equally successful in the accessories. He was the first who painted flowers on a light ground. His colours still retain their lustre, and his pictures are held in the highest estimation. He died in England in 1749.

HYACINTH. Few spring flowers are more worthy of cultivation than the hyacinth, whether we regard its varied shades of rich colour or the sweetness of its perfume. The soil and climate of Holland seem to be peculiarly adapted to this plant, for however well the imported roots

flower in England for the first season, they soon degenerate. It is however probable that this arises in some degree from want of skill in the cultivation; for some gardeners have been successful in growing the same roots for several years in succession. The compost used at Haarlem is rotten cow-dung, rotten leaves, and fine sand. The bed into which this compost is to be put must be taken out to the depth of three feet, its bottom made firm, and a few stones thrown into it in order to keep it dry. It must then be raised considerably above the level of the surrounding soil with the compost already prepared. The best season for planting is from October to the beginning of November, and the early sorts planted at this time will begin to show their flowers in the beginning of April.

As hyacinths are planted in autumn, and bloom early in the season, they never require any water, and, as soon as the flowering is over, the more dry the ground can be kept the better it is for the bulbs. When the leaves turn yellow and are withered, which will take place in about a month after the plants have gone out of flower, the bulbs must be carefully taken up and dried.

Hyacinths are frequently grown and flowered in water-glasses. Sometimes before they are put into the glasses they are planted in pots, and when the roots have grown a little they are taken up and washed, and placed in the glasses, or they are placed in the glasses at first. The water must be frequently renewed, or it will soon become fetid and offensive. To prevent their growing long, weak, and pale, so as to flower badly, they should be kept close to a window, where they can be constantly exposed to bright light all day long. In order to secure their pushing out their roots before the leaves lengthen, they should always be kept in the dark for a fortnight or three weeks after they are first placed in the water-glasses, care being taken at that time that the water and the bulbs are not in contact. The moisture that rises into the air will be sufficient to induce the bulbs to put forth roots; and the total absence of light will prevent the leaves from being stimulated into growth.

HYADES. [TAURUS.]

HYÆNA. In his last subdivision of the digitigrade Carnivora Cuvier includes two groups, the Hyænas and the Cats. It appears to us that the Hyænas constitute a family including the Proteles [AARD-WOLF], and linked by the latter to the Civits. [VIVERRIDÆ.]

The Hyænas are distinguished by having their fore legs longer than their hind legs, by their rough tongue, great and conical molar or rather cutting-and-crushing teeth, projecting eyes, large ears, and a deep and glandular pouch beneath the anus.

Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{4-4}=34$.

The false molars, three above and four below, are conical, blunt, and very large. The upper flesh-tooth (carnassière) has a small tubercle within and in front, but the lower one has none, and presents only two trenchant points. The whole of the dental and molar organisation, and indeed the whole cranial structure, appears to have been formed with a view to the bringing into the most available action the formidable natural instruments which enable the Hyænas to break the hardest bones.

The Hyænas are ferocious, cowardly, nocturnal animals, and in some countries, where they swarm in legions, are the dread of whole districts, in which however they in some measure repay the injuries they commit by their services as scavengers. They seldom attack men, unless forced in self-defence, but often carry away children, and destroy sheep, asses, calves, and even cows. The strength of their neck and jaws is prodigious, but their hinder quarters seem to be comparatively feeble, and they run along with a sort of shuffling gait. During the day they conceal themselves in caverns, amidst ruins, and in other obscure retreats. They are skulking, prowling, and, poetically speaking, mysterious beasts. Their wild howlings during the hours of darkness are well calculated to appal even man; and the timid beasts upon which they habitually prey crouch panic-struck, or take to flight. Then it is that these savage and yet cowardly carnivoræ feel themselves confident of success, and press upon their unresisting victims.

The strength of these animals and their power of dragging away large bodies is strikingly exemplified in Colonel Denham's narrative. At Kouka he relates that the Hyænas, which were everywhere in legions, grew so extremely ravenous, that a good large village, where he sometimes procured a draught of sour milk on his duck-shooting excursions, had been attacked the night before his last visit, the town absolutely carried by storm, notwithstanding defences nearly six feet high of branches of the prickly tulloh, and two donkeys, whose flesh these animals are, according to our author, particularly fond of, carried off, in spite of the efforts of the people. 'We constantly,' continues Colonel Denham, 'heard them close to the walls of our own town at nights, and, on a gate being left partly open, they would enter and carry off any unfortunate animal that they could find in the streets.' From the same narrative it appears that it was necessary to protect the graves from the attacks of these rapacious brutes. Mr. Toole's grave had a pile of thorns and branches of the prickly tulloh, several feet high, raised over it as a protection against the flocks of hyænas which nightly infest the burying-places in that country.

The hyænas are confined to Asia and Africa, at least in the present day, and the following species are known:—

1. The Striped Hyæna (*Hyæna striata*, Zimmerman). Colour variable, generally gray, irregularly barred with brown or blackish brown. A mane runs along the spine from the back of the head, which mane is bristled up when the animal is roused to anger. Locality, India, the mountains of Caucasus, and the Altaic Chain, Asiatic Turkey, Syria, Persia, Barbary, Senegal, and central Africa generally. Susceptible of domestication. ('Proceedings of the Zoological Society,' 1830-1.)

Striped Hyæna (*Hyæna striata*).

2. The Spotted Hyæna (*Hyæna crocuta*, Erxleben, *H. Capensis*, Desm.). This is the Tiger-Wolf of the colonists of the Cape.

Spotted Hyæna (*Hyæna crocuta*).

General colour, gray or grayish brown, irregularly spotted with black. Locality, Southern Africa.

Mr. Steedman, in his 'Wanderings and Adventures in the Interior of Southern Africa,' gives most appalling accounts of the rapacity of the Spotted Hyæna. He states that Mr. Shepstone, in a letter from Mamboland, relates that the nightly attacks of the wolves, as the Hyænas are generally called, have been very destructive amongst the children and youth; for within a few months not fewer than forty instances came to his knowledge wherein that beast had made a most dreadful havoc. 'To show clearly,' says that gentleman, 'the preference of the wolf (Spotted Hyæna) for human flesh, it will be necessary to notice that, when the Mambookies build their houses, which are in form like beehives, and tolerably large, often 18 or 20 feet in diameter, the floor is raised at the higher or back part of the house, until within 3 or 4 feet of the front, where it suddenly terminates, leaving an area from thence to the wall, in which every night the calves are tied, to protect them from the storms or from wild beasts. Now it would be natural to suppose that, should the wolf enter, he would seize the first object for his prey, especially as the natives always lie with the fire at their feet; but, notwithstanding this, the constant practice of this animal has been in every instance

to pass by the calves in the area, and even by the fire, and to take the children from under the mother's kaross, and this in such a gentle and cautious manner, that the poor parent has been unconscious of her loss until the cries of her little innocent have reached her from without when a close prisoner in the jaws of the monster.' Mr. Shepstone then particularises two instances within his own knowledge, one of a boy about ten years of age, and the other of a little girl about eight, who had been carried off by this species, and wretchedly mangled, but recovered by the attention of Mr. Shepstone and his friends. Notwithstanding this ferocity, the Spotted Hyæna has, it is stated, been domiciliated in the houses of the peasantry, 'among whom,' says Mr. Bennett, 'he is preferred to the dog himself for attachment to his master, for general sagacity, and even, it is said, for his qualifications for the chase.'

3. The Villose Hyæna (*Hyæna villosa*, Smith; *H. brunnea*, Thunberg). Colour, a dark brownish gray, with blackish stripes on the limbs. Locality, South Africa. This is the Straand Wolf of the Cape colonists, so called from its frequenting the sea-coasts. The Straand Wolf devours carrion and

Villose Hyæna (*Hyæna villosa*).

such dead animal substances, whales for instance, as the sea casts up: but when pressed by hunger its habits seem to resemble those of the other species, for it then commits serious depredations on the flocks and herds of the colonists, who hold its incursions in great dread. Mr. Steedman, who states this, says that he saw a very fine specimen, which had been shot by a farmer residing in the vicinity of Blauwberg, and was informed that it had destroyed three large calves belonging to the farmer. He adds, that it is said to be a remarkably cunning animal, retiring to a considerable distance from the scene of its depredations to elude pursuit, and concealing itself during the daytime in the mountains, or in the thick bush which extends in large patches throughout the sandy district in which it is usually found.

Fossil Hyænas.—Fossil Hyænas occur abundantly in the third period of the tertiary deposits (Pliocene of Lyell), especially in the ossiferous caverns. Dr. Buckland's 'Reliquiæ Diluvianæ' in particular, should be referred to by the student for the history of these extinct species and the

bones collected by them in the caves of Kirkdale, Kent's Hole, &c., but particularly the former.

HYÆNA DOG (*Lycaon tricolor*, Brookes; *Canis pictus*, Desmarest; *Hyæna venatica*, Burchell), the Cape Hunting Dog. This daring and ferocious animal, one of the pests of Southern Africa, is a complete dog, or *Canis*, in the form of the skull and the characters of the teeth; it has however, as in the hyænas, only four toes on the anterior feet, and the same on the feet behind. In figure it is tall, lightly built, but muscular and well proportioned; the limbs are long, the ears large and erect, the jaws powerful, and the teeth strong. Its aspect is wild and fierce, and its disposition treacherous. The fur is close and of a sandy yellow, irregularly clouded and blotched with black and a little white. The tail is somewhat bushy and of moderate length. The colour is subject to variation. Mr. Burchell, who brought into this country the first specimen, states that it hunts in packs, at night by preference, but frequently in the day. He describes it as swift, fierce, and active, so that only those animals which are gifted with great fleetness can escape from it. It attacks sheep openly and fearlessly; it approaches oxen and horses more cautiously, advancing upon them by stealth, biting off the tails of the oxen, and injuring the horses, especially young colts, so severely that they rarely survive.

HYALÆ'IDÆ, a family of *Pteropoda* according to the systems of Lamarck and Cuvier, but belonging to the family *Thecosomata* (order *Aporobranchiata*) of De Blainville. M. Rang, in his 'Tableau Méthodique,' follows De Férussac in making the *Hyalæidæ* a family, and enumerates the following genera as composing it: *Cymbulia*, *Limacina*, *Hyalæa*, *Cleodora*, *Cuvieria*, *Euribia*, and *Psyche*.

Animal furnished with a head, but it is not distinct, with a third natatory membrane smaller and intermediate at the ventral part; mouth situated at the bottom of a cavity formed by the union of the locomotive organs. Shell nearly always present, and very variable in form.

HY'BODUS, a genus of fossil fishes placed in the order of *Placoïdians* by M. Agassiz, 'Recherches sur les Poissons Fossiles.' The information which M. Agassiz has collected concerning this extinct group of fishes appears to be considerable, yet only in a few instances (from the lias of Lyme Regis and Bristol) has he been able to reconstruct the whole skeleton. The species of Hybodus are supposed to amount to twenty-two, and extend from the new red sandstone to the chalk inclusive.

HYBRID. [MULE: and see, as far as Zoology is concerned, the different articles where Hybrids are noticed; CANARY BIRD, and HORSE, for instance.]

HYDA'TICA, a genus of fossil plants (probably aquatic) from the coal formation.

HYDA'TIDS (*ὑδατίς*, a vesicle, from *ὕδωρ*, water). This name has been applied to various bladder-like productions, which are sometimes found in the bodies of men and animals.

The term hydatid comprehends, firstly, several species of entozoa, or parasitic animals, which have a distinct independent vitality; secondly, the simple unattached cysts which are frequently met with; and, lastly, what have been called false hydatids, which are vesicular bodies, either entirely or partially connected with the tissues by which they are surrounded.

Hartmann, in 1686, first clearly observed that many of the bodies, or cyst-like tumours, called hydatids, were distinct living beings, or parasitic animals. Since his time the subject has been more thoroughly investigated, and there is now no doubt of the animal nature of a large number of hydatids. Pallas arranged all the cystic entozoa, except the common globular hydatid, or *Acephalocyst* (which was only considered as a simple serous cyst before the time of Laennec), under the genus *Tænia*, on account of the similarity of structure between their mouths and those of the tape-worm. Cuvier and other French naturalists gave all these entozoa the generic name of *Hydatis*, but Rudolphi has since shown that they cannot be all placed in one genus, but should be divided into several genera, as *Cysticercus*, *Cœnurus*, and *Echinococcus*, to which may be added *Acephalocystis*. [ENTOZOA.] Several species of *Cysticercus* are enumerated, but the most common are *C. tenuicollis* and *C. cellulosus*. *C. tenuicollis* is met with frequently in the peritoneum and pleura of ruminating animals and pigs. It is often generated in the disease of sheep called the rot, where another entozoon, the *distoma*, or fluke-worm, is met with in the ducts of the liver. The *C. cellulosus* is found generally lodged in the tissue of the muscles between the fibres; it occurs sometimes in man, but more frequently in animals, particularly in the hog, where it causes the disease called measles or leprosy. Of the genus *Cœnurus* the species *C. cerebralis* is found in the brain of sheep, oxen, and other ruminating animals. The hydatids belonging to the genus *Echinococcus* consist of a cyst containing a number of small animals of low organisation. The *Acephalocyst* is a simple unattached vesicle, varying in size from a millet-seed to a child's head, filled with pellucid fluid, furnished with no kind of appendix or head, generally associated with numerous others, and contained in a common cyst, which is also filled with fluid.

Hydatids may be developed slowly, and occasion so little inconvenience, that persons in whom they have been discovered after death may not have suspected disease of the organ in which they existed during life. Occasionally they cause so much irritation that suppuration may take place either around or within the common sac, which may burst externally or into a serous or mucous cavity. In either the first or last case the hydatids will be discharged, and the patient may recover; but if the cyst should communicate with a serous cavity, as the peritoneum or pleura, fatal inflammation will occur.

With respect to the treatment for the prevention or removal of hydatids, it must necessarily, from the obscure notion of the symptoms of the presence of these animals, be of a very uncertain kind.

HYDE, SIR NICHOLAS, was appointed

chief justice of the King's Bench in 1626. He was the uncle and preceptor of the first Earl of Clarendon. The most important trial upon which Sir Nicholas Hyde presided was the one in which Eliot, Hollis, and Valentine were indicted for forcibly holding down in his chair the speaker of the House of Commons, at the violent close of the parliament of 1627. The court refused to allow to the prisoners their Habeas Corpus, and inflicted fines upon them of considerable amount. He died at Hinton Lodge, Hampshire, Aug. 26, 1631, aged 59.

Lawrence Hyde, who succeeded his father Sir Nicholas in the baronetcy, became principally remarkable for the personal share which he had in furthering the escape of Charles II., after the battle of Worcester. The circumstances are told in detail in a manuscript written by Mr. Hyde's cousin, Colonel Gounter. This manuscript is now in the British Museum. He died in 1682.

HYDE, EDWARD, EARL OF CLARENDON, the third son of Henry Hyde, of Dinton, in Wiltshire, was born at Dinton, Feb. 18, 1608.

He studied at Magdalen College, Oxford, and afterwards in the Middle Temple. His legal studies were somewhat interrupted by the weakness of his health, the habits of his companions, and an attachment for the daughter of Sir George Ayliffe, whom he married in 1629. This lady died six months after their marriage, and in 1632 he married the daughter of Sir Thomas Aylesbury.

After his father's death Hyde found himself in possession of a competent fortune. In the spring of 1640, he was returned to parliament by the constituencies both of Shaftesbury and Wootton Basset, and made his election to serve for the latter. The borough of Saltash returned him to the Long Parliament (Nov. 1640). Up to the time when a bill was passed for preventing the dissolution of parliament without its own authority and consent, Hyde had acted with the moderate portion of the popular party, and indeed had obtained several important reforms; but the democratic tendency of this measure caused him to change his views. He now gave his support to the Church, defended the prerogative of the crown, and became one of the three councillors appointed by the king to consult upon and conduct his affairs. These councillors however were by no means responsible for all the king's actions. Charles sometimes acted without their consent and knowledge. For instance, in the attempt to seize the five members, his advisers were wholly ignorant of his intention, and were displeased and dejected by the perfidy and rashness of the act.

The queen quitted England in 1642, and Charles left London, not again to reside there until he was a prisoner. Hyde followed him to York, and continued to act as the king's adviser until the civil war broke out. He accepted the chancellorship of the exchequer, and was knighted and sworn a member of the privy council. In 1645 the king thought fit to send the Prince of Wales into the West, and to name Hyde one of the councillors to attend upon and direct him. Hyde eventually accompanied the prince in his flight, and landed with him at Jersey, where the prince left him to join the queen in France. Hyde now felt his position to be so dangerous, that he made his will, and wrote letters to be delivered to the king and prince after his death. It might be expected that under such adverse circumstances his spirits would have failed, but constant occupation sustained them; he collected all the materials that he was able, and commenced his 'History of the Rebellion.'

In September 1648, Hyde rejoined the prince at the Hague; and here he heard of the execution of the king.

The disposition of the Spanish court towards the youthful Charles II. disposed him to send an embassy to Madrid. Hyde and Cottington were appointed, and during fifteen months negotiations were carried on by them without the establishment of friendly relations. At length the ambassadors received the command of the King of Spain to retire. Hyde quitted Madrid in 1651, and lived at Antwerp with his family until the autumn, when the king returned to Paris. Here he conducted the principal business of the English court, relieving its pecuniary embarrassments as far as his own poverty would permit him, until the Restoration, when, from a powerless and poverty-stricken guardian of an exiled king, he suddenly rose to be the 'first in place, favour, and authority, among the ministers of a monarch, who, while invested by the public with sovereign power, still evinced towards him the deference of a pupil.'

The part that Hyde took in the principal measures that occupied the parliaments after the Restoration may be learned from Lord Clarendon's 'Life,' in Mr. Lister's 'Life of Clarendon,' and Burnet's 'History of his own Times.' We pass to the narration of an event of immediate personal importance to the Lord Chancellor (the appointment had been conferred on him before the Restoration), which occurred in the autumn of 1660. Anne Hyde, his daughter, had contracted an attachment to the Duke of York, the result of which was a secret marriage, in time to legitimatise their first child. This marriage was offensive, not only at court, but also to the Chancellor, 'who broke out,' as he tells us, 'into an immoderate passion against the wickedness of his daughter.' The king entertained no suspicions of artifice or collusion on the part of Hyde, and, to prove that he entertained none, created him a baron, under the title of Lord Hyde of Hindon. On the occasion of the coronation, which took place in April 1661, the further dignity of the earldom of Clarendon was conferred on him, and he received from the king a gift of 20,000*l*.

Hyde took an active part in the king's marriage with Catherine of Portugal, the negotiation of a loan from the King of France, and the sale of Dunkirk. The opposition of the chancellor to the king's inclination to Catholicism, as well as to other wishes he had formed, diminished his share of royal favour, and gave opportunity to his enemies to cabal against him. But an attempt made by the Earl of Bristol to impeach the chancellor for high treason proved ridiculously unsuccessful, and he still continued at the head of affairs. A series

of disastrous events however—the embarrassment of the country at home, and its disgrace abroad—all contributed to diminish his popularity. His influence was successfully undermined, and by the king's command he resigned the great seal on the 30th of August, 1667. The Duke of Buckingham was then restored to office.

Seventeen articles of impeachment against Clarendon were then drawn up by a committee of the House of Commons; but the accusation founded upon them was rejected by the Lords, and during the contention that followed the ex-minister quitted the kingdom. A bill for banishing and disenabling Clarendon was passed by the Lords on the 12th of December, and by the Commons on the 18th.

The public life of Clarendon was now at end; he was permitted by the King of France to reside within his kingdom, and at Moulins he commenced the continuation of his 'Life.' In the spring of 1674 he procured a house at Rouen, which was his last residence. Repeated attacks of gout had enfeebled his constitution, and he expired Dec. 9, 1674, in the 65th year of his age.

By his second wife, who died in 1667, he had six children, four sons and two daughters.

HYDE, THOMAS, D.D., was born June 29th, 1636, at Billingsley near Bridgenorth, in Shropshire. He received his first instruction in the Oriental languages from his father, and afterwards studied them under Wheelock, in the university of Cambridge, where he remained about a year. He afterwards went, at the age of seventeen, to London, to assist Walton in editing the Polyglott Bible. In 1658 he entered Queen's College, Oxford; in 1659 was appointed under-librarian of the Bodleian, and in 1665 principal librarian. In 1660 he became a prebendary of Salisbury; in 1678 archdeacon of Gloucester; and in 1682 took the degree of D.D. On the death of Pococke, in 1691, Hyde was appointed Laudian professor of Arabic; and not long afterwards Regius professor of Hebrew, and canon of Christchurch. He resigned the librarianship of the Bodleian in 1701, and died on the 18th of January, 1703.

Hyde possessed an accurate knowledge of almost all the Asiatic languages which were at that time accessible to European scholars. His most celebrated work is entitled 'Veterum Persarum et Magorum Religionis Historia,' Oxf., 1700, reprinted in 1760.

HYDER ALI was a soldier of fortune, who began his career in the service of the Raja of Mysore in 1749, and, ascending step by step, reached in 1759 the rank of commander-in-chief of the Raja of Mysore. After one or two turns of fortune, Hyder not only established himself firmly as prime minister, but pensioned off his master with three lacs of rupees yearly, and became in 1761 the undisputed ruler of Mysore. From this moment he applied diligently and successfully to the increase of his power. His encroachments led to an offensive alliance between the Mahrattas, the Nizam, and the East India Company: but he found means not only to break up this confederacy, but to engage the Nizam in war against his late friends the British, in 1767. This war was carried on, little to the advantage of the English, for two years, when at last Hyder, by a bold and able stroke, placed himself in a condition to prescribe terms of peace, of which the chief conditions were a mutual restitution of conquests and an alliance in defensive wars.

In 1770 the Mahrattas invaded Mysore, and reduced Hyder to great difficulty. He recovered himself however, and in 1780 burst with a vast army into the Carnatic. He met with continual success, and refused any terms of peace. The war therefore continued on the same footing until Madras was reduced to a frightful state of famine, when the death of Hyder, in November 1782, relieved the English from danger. His son, Tippoo, concluded peace on the terms of a mutual restitution of conquests.

HYDRA, Island. [GREECE, KINGDOM OF.]

HYDRA (constellation, ὕδρος in Ptolemy), the Water-Snake, one of the old constellations. From the time of Arátus downwards it has always been a triple figure: a long snake, represented as trailing upon the ground, bears upon his back a cup (Crater), and nearer to his tail is seated a crow (Corvus). The mythological meaning is altogether unknown.

The great length of this constellation has caused it to be divided into four parts, which are designated as Hydra, Hydra et Crater, Hydra et Corvus, and Hydræ Continuatio. The first contains the head and body up to about $10\frac{1}{2}$ hours of right ascension, all near to and south of the bright star Regulus; the second contains the cup and the parts of the body adjacent; the third the crow, with the parts of the body adjacent; and the fourth (beginning at about 13 hours of right ascension) contains the tail.

HYDRABAD. [HINDUSTAN.]

HYDRACIDS are such acids as contain hydrogen instead of oxygen as the acidifying power: hydrobromic and hydrochloric acids are examples. Their acidity is in general very strongly marked. They contain only one equivalent of hydrogen, and, when acted upon by metallic oxides, they lose their hydrogen by its combining with the oxygen of the oxide, and the results are water and a chloride. All the hydracids are gaseous, and are easily combined with water, forming solutions which possess the well-known and strongly marked properties of sourness, acting upon carbonates, and reddening vegetable blue colours. They are all artificial products.

HYDRA'NGEA, a well-known genus of hardy shrubs, of which one species is commonly cultivated for the sake of its beautiful flowers. This plant is a native of China and Japan; it was originally observed in the gardens of Canton by Loureiro, who took it for a primrose, and called it *Primula mutabilis*. When this plant is hardy enough to survive the winter, it grows to a considerable size, and, when covered by a multitude of its very large round heads of rosy flowers, becomes a magnificent object. To have it in perfection it should be planted in the open ground in rich soil. During winter it should be covered with a mat well stuffed with straw.

HYDRATES. The term hydrate is usually

applied to compounds which contain water in definite proportion, which does not impart regularity of form, or, in other words, give crystals with the body with which it so unites. Thus, when water is added to potash, it may form with it either water of solution, water of crystallisation, or water which constitutes it an hydrate; and it is observable that, while water of solution has comparatively little affinity for the substance with which it is combined, water of crystallisation has more, and water with which the body constitutes an hydrate has the greatest affinity of all.

HYDRAULICS. This term is applied to the art of constructing machines in which water is employed as a moving power, or by which that fluid is put in motion; and in it are necessarily included the principles by which such machines are executed. The art of constructing docks, quays, or any buildings whose foundations are laid under water, is denominated hydraulic architecture. Of this subject a brief notice will first be offered.

No countries in Europe possess more advantages with respect to naval power than Great Britain and Ireland. The islands and headlands on their coasts form excellent natural ports; and these, where necessary, have been converted into secure harbours by every means which the science of the hydraulic engineer could devise. The Breakwater at Plymouth, the lighthouses which have been raised in the ocean, and the vast docks at the principal seaport towns, are so many practical examples which render the British Isles a complete school for the study, in detail, of every subject connected with this branch of art.

Hydraulic architecture chiefly now involves the construction of masses of masonry whose foundations are laid in the beds of rivers or in that of the sea, such are the piers of bridges, quays, jetties, and breakwaters; also the formation of artificial harbours and docks for shipping, and locks at the falls on rivers or canals. In all these cases great precautions are requisite to secure the foundations, and give the superstructure sufficient strength to resist the hydrostatical pressure of water which may find its way under or behind, and cause the destruction of the works. The starlings of the old bridges at London and Rochester were examples of the rude methods anciently employed in this country for building in water. Caissons resting on piles driven deep into the ground under the intended work are occasionally employed when the water is not very deep and the soil good. But no work of magnitude can be considered as secure whose foundations are not laid by the engineer in the bed of the water; for this purpose the part on which the construction is to be raised should, if possible, be laid dry by inclosing it within a coffer-dam, and actually drawing off the water by engines.

From an opinion that the oscillations of the particles of water in waves take place in vertical directions, and because waves become broken in ascending an inclined plane, it has been of late proposed to make the faces of sea-walls quite upright; but, since in storms the sea is driven with violence against any object before it, the stability of a wall or breakwater seems to require that its sea-face should have a certain slope. In very deep water, probably the best method of forming an embankment is to allow large blocks of stone, with small fragments intermingled, to descend by gravity into the water, as was done in forming the breakwater at Plymouth.

Machinery of some kind for the purpose of raising water in order to drain lakes or marshes appears to have been executed in Egypt at a very remote period, and the hydraulic machines described by Vitruvius in the tenth book of his 'Architecture' are sufficiently simple to allow the supposition that they had been invented at a very early epoch. That writer mentions a wheel with buckets, which took up water from a reservoir on the ascending side of the wheel, and discharged it on the opposite side, in consequence of the reversion of their position. He moreover notices a species of chain-pump, and the spiral machine of Archimedes. All of these were intended for the same purposes, and were turned either by the impulse of a stream in which they were placed, or by men walking upon them; that is, probably, on the exterior circumferences of the wheels attached to the axles of the machines. Water-wheels for grinding corn are also described by Vitruvius; and, lastly, the same writer gives a brief and obscure indication of an hydraulic organ for producing modulations of sound.

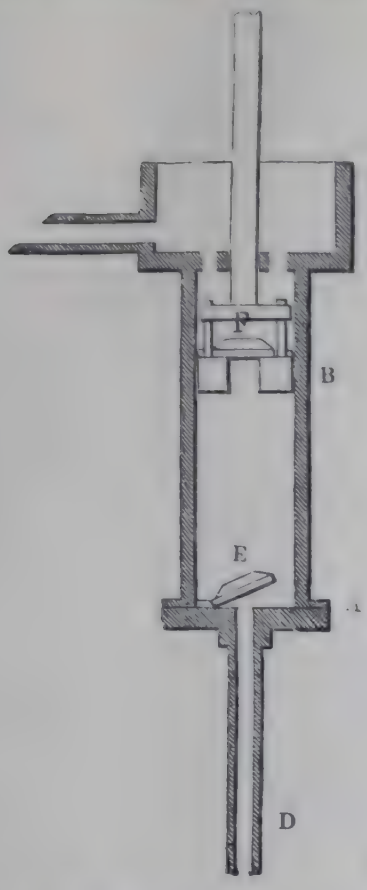
Since those days hydraulic machinery has been brought to the state in which it now exists by many successive improvements. It may be remarked however that, on account of the high degree of perfection which, within a few years past, the steam-engine has attained, the employment of hydraulic machines for raising great quantities of water, or as first-movers with respect to extensive works of any kind, has of late considerably diminished. Yet, where the circumstances are favourable, as when a supply of water for working the machine can be readily obtained, the latter, from being less expensive in their construction, are still preferred to the former.

The principal hydraulic machines which are in use for domestic or general purposes are the Siphon, the Screw of Archimedes the various kinds of Pumps, the Hydraulic Press, and Wheels turned by water. For the first two see SIPHON and SCREW OF ARCHIMEDES. The others will be now briefly described.

The common pump is a machine for raising water by the pressure of the atmosphere: it consists of a cylindrical body, or barrel, A B, from the lower part of which a tube D descends into the water contained in the well or reservoir. In the interior of the cylinder is a moveable piston F, surrounded with leather in order that it may be water-tight, yet capable of moving up and down with freedom. The piston is perforated, and the orifice is covered above by a valve which opens upwards: a similar valve E, at the bottom of the cylinder, or barrel, covers the upper extremity of the tube which leads to the well.

The piston being raised by means of the handle, the air contained in the tube D tends by its elasticity to occupy the lower part of the cylinder,

which it enters by forcing up the valve E; and its elasticity diminishes in consequence of its



occupying a greater space than before. Hence the air exerts on the surface of the water within the tube, at D, a less pressure than that which the external air exerts upon the water in the well; and the water consequently rises in the tube to a certain height. The valve E then falls over the orifice, and, the piston being depressed, the air contained between it and the bottom of the cylinder will be condensed; in which state it will force up the valve F, and escape at the top of the pump. The valve F then falls; and, if the piston be again elevated, the water will rise higher in the tube D for the same reason as before. The operation of raising and depressing the piston being repeated a few times, the water will at length enter into the cylinder through the valves E and F; after which it will, at each stroke of the piston, be forced through the spout. Since the column of water in the pump is supported by the pressure of the atmosphere on the water in the well, it is evident [PNEUMATICS] that the greatest height of the piston above the surface of that water must always be less than 33 feet.

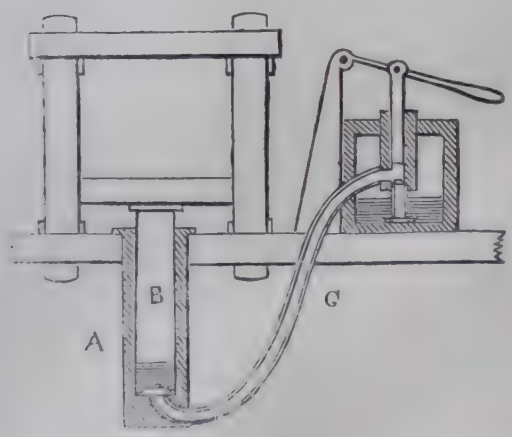
That which is called a lifting-pump is frequently similar in construction to the common pump above described; but the lower valve E is always below the surface of the water in the reservoir, and the piston F is so when depressed to the bottom of the cylinder or barrel. On raising the piston, the water above it is lifted up, and the pressure of the external atmosphere forces the water of the reservoir to enter into the cylinder through the valve E. Then, by successive depressions and elevations of the piston, the water is at length raised to the top of the pump, and discharged by the spout.

The forcing-pump is one in which the water, when raised in the barrel, is driven through an orifice in its side by the depression of the piston F, which is solid, or without a perforation; it is also, in general, provided with an air-vessel, into which the water is forced, and whence, by the elasticity of the condensed air, it is made to issue through a pipe inserted in the upper extremity.

For raising water from great depths and in large quantities chain-pumps, as they are called, have been frequently employed. In this machine a chain, carrying a number of flat circular pistons, passes round a wheel at the upper, and sometimes also at the lower extremity, each piston, as it goes over the wheels, being in part received in the intervals between the radii. The wheel being put in motion, the pistons descend in a barrel on one side, and enter from below into another on the ascending side, when, pushing the water before them, they raise it into the reservoir, from whence it escapes by a pipe.

Pumps of this kind are frequently fixed in inclined positions; and it is when the inclination of the barrel is about $24\frac{1}{3}$ degrees, the distance of the pistons from one another being equal to their diameter, that the greatest quantity of water is raised.

The Hydraulic Press was invented by Mr. Bramah, and is a machine of very great power in compressing bodies or lifting weights; or, again, in drawing up trees by the roots, or piles from the beds of rivers.



A is an iron cylinder in which works the piston B. At the bottom of the former is inserted the tube C, whose aperture, under the piston, is covered by a valve. The other end of C communicates with a small forcing-pump, by which water is driven through the said valve into the lower part of the cylinder, where its hydrostatical action is exerted to raise up the piston.

Now suppose the diameter of the cylinder to be 10 inches, and that of the piston in the forcing-pump to be one quarter of an inch, then the proportion between the surfaces of the pistons will

be that of 1600 to 1; and, on the principle of the equal pressure of fluids in every direction, the force with which the piston B is raised is to the resistance against the lower surface of that in the forcing-pump in the same proportion.

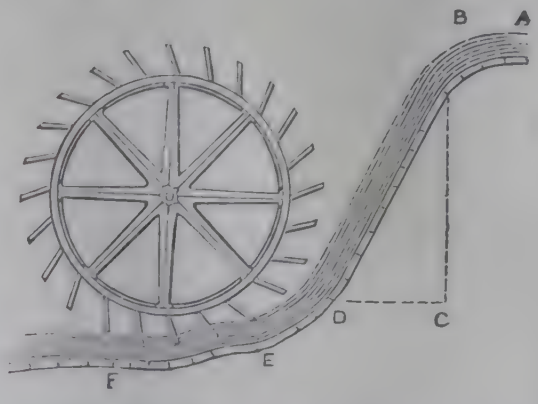
Water may be made to act as a moving power against wheels by its weight, its momentum, or by both combined. In the first case the wheel is provided with a number of buckets, or troughs, into which the water is received near the level of the axle of the wheel; the vessels thus filled becoming heavier than those on the other side, the wheel is made to revolve by that excess of weight merely. But, if the water fall into the troughs from a channel on a level with the top of the wheel, or at least above the axle, the wheel will revolve both by the weight and by the momentum which the water acquires by its fall. This is called an *overshot* wheel.

Again, if the lower part of the wheel be placed in a stream of water which is made to act on float-boards fixed on the circumference, the machine has the name of an *undershot* wheel. Lastly, when the wheel is placed in a sort of channel, or *race*, as it is called, which is formed between two projections of masonry below the bed of the upper portion of the stream, and so as to coincide very nearly with the lower quadrant of the wheel's circumference on that side, the water descending from the stream upon float-boards, or troughs, and thus acting both by its momentum and weight, the machine is called a *breast*-wheel.

Many contrivances have been adopted for enabling the troughs of an overshot wheel to retain, during their descent, as much as possible of the water which, by entering into them, causes the wheel to revolve; and one of those, which Dr. Robison considers as the most approved, consists in making the side of each trough with three boards parallel to the axle of the wheel: that which is nearest to the *sole* or convex surface of the wheel having its breadth in the direction of the radii and equal to half the interval between the troughs, which is usually about $\frac{1}{10}$th of the circumference of the wheel; and the two other boards making a very obtuse angle with one another, the upper edge of the third being rather above the lowest board in the next higher trough. Mr. Smeaton's inference from his experiments is, that in small works the rim of an overshot wheel should have a velocity of about three feet per second only; but in large works it may be greater. He estimates the greatest quantity of work performed at about two-thirds of the power expended.

The theory of undershot wheels is very imperfectly known; but it seems, from the experiments of De Parcieux and Bossut, that a sensible advantage is gained by inclining the float-boards to the produced radii of the wheel at an angle of about twenty degrees, each board when at the lowest place having its edge turned towards the upper part of the stream. Such inclination will cause the water to heap up along the float, and thus act by its weight as well as its pressure; the floats should consequently be rather broader than the depth of the vein of water which they intercept.

The canal A B, which conducts the water from



the river to the wheel, should have a small descent, and the masonry at B should be rounded; the inclination D B C of the fall may be about 25° 50′, and a concave figure should be given to the masonry at D. Beyond F the bed should fall to a depth of several inches, that the water may flow off without retarding the motion of the wheel.

It has been determined by experiment that the effect of the wheel is the greatest when its velocity is about half the velocity of the stream; and it is asserted that the efficacy of an overshot wheel is more than double that of an undershot wheel of equal magnitude.

Mr. Smeaton considers that a breast-wheel unites in some measure the advantages of both the others; for, when the water strikes at a certain point below the surface of the stream, and afterwards descends in a circular arc upon the floats, the effect of such a wheel will be the same as that of an overshot wheel when the latter is acted on by a head of water equal to the difference of level between the surface of the reservoir and the point where the wheel is struck, together with that of an undershot wheel which is acted on by a head equal to the difference of level between the point where the wheel is struck and the surface of the water below.

HYDRIODIC ACID. [IODINE.]

HYDROBATES. [FULIGULINÆ.]

HYDROCELE (from ὕδωρ, water, and κήλη, a tumour) is a collection of watery fluid in the tunica vaginalis testis. The treatment consists, 1st, in the evacuation of the fluid by tapping; and 2nd, in preventing it from accumulating again by exciting such active inflammation of the opposite surfaces of the tunica vaginalis as may produce their adhesion and the obliteration of the cavity.

HYDROCE'PHALUS (from ὕδωρ, water, and κεφαλή, head), water in the head, is a name applied to two diseases nearly peculiar to infancy and childhood, which are distinguished as the acute and the chronic.

Acute Hydrocephalus is a most frequent and fatal disease of the early stages of life. It occurs most commonly between the first and the eighth year. The child is frequently ill for several days before the inflammatory symptoms become evident; it is liable to momentary giddiness while moving quickly, is fretful and nervous, and its rest is dis-

turbed; it loses its appetite, its bowels are costive, and the motions offensive. The eyes become heavy, the face pale, the features devoid of animation, and the child complains of heaviness of the head. The symptoms more surely indicative of the disease are more intense pain in the head, to which the child constantly carries its hand; intolerance of light, sound, and motion; disturbed sleep, with grinding of the teeth, the child frequently waking with a scream; the pulse is slow and irregular. The appetite is lost, the evacuations from the bowels are unhealthy, and vomiting ensues. The abdomen, if previously distended, now falls in, and becomes quite flat. Stupor, interrupted by screams, follows. After these symptoms have continued for some hours or days, there will sometimes be a temporary recovery of sense; but this promising state is soon interrupted by convulsions, complete loss of sight and hearing, and inability to swallow; the extremities become cold, and death follows.

The treatment must vary in the different stages of the disease, but will generally consist in endeavouring to subdue inflammatory action, in removing any causes which may, directly or indirectly, keep up irritation of the brain; and lastly, in the latter stages, in supporting the strength of the system.

Chronic Hydrocephalus.—The disease to which this name is applied is correctly denominated Water in the Head, being always accompanied with a considerable collection of watery fluid in the cavity of the head, sometimes within the membranes of the brain only, and exterior to the organ itself, but more frequently in the ventricles or cavities of the cerebral hemispheres, which are then distended to the form of a sac. The quantity of fluid is sometimes so great as to cause an increased size of the skull, amounting to great deformity. The disease generally arises before or very soon after birth; and, the cranial bones not being completely ossified at the time of its commencement, they become separated to a distance from each other, and the sutures remain open for a long period. When the disease comes on after birth, its early progress is very insidious.

In the majority of cases medical treatment is quite useless.

HYDROCHARA'CEÆ, a small natural order of endogenous plants inhabiting ditches, lakes, and rivers, in various parts of the world. None of the species are of any known use, except the *Valisneria alternifolia* of India, which is used for the purpose of conveying water mechanically to sugar in the process of refining it. *Valisneria spiralis* is remarkable for its spiral flower-stalk, which enables it to accommodate itself to the depth of the stream in which it floats, so as to keep its flowers above the water.

HYDROCHŒRUS, Brisson's name for the *Capybara* of Marcgrave, *Cochon d'Eau* of Des Marchais, *Cabiai* of Buffon.

$$\text{Incisors, } \frac{2}{2}\text{; molars, } \frac{4-4}{4-4} = 20.$$

Molars compound, the posterior teeth the longest, and formed of numerous laminæ, which are simple and parallel; the laminæ of the anterior molars forked. The other characters are principally found in the four anterior and three posterior toes with which the feet are furnished (all of which are armed with large nails, or rather hoofs, and united by membranes), the compressed muzzle, the absence of the tail, and twelve teats.

The only species is *Hydrochœrus Capybara*, *Cavia Capybara* of Gmelin, *Sus Hydrochœris* of Linnæus.

Capybara (*Hydrochærus capybara*).

Head very large and thick; nose wide; whiskers long and stiff; eyes large; ears rounded and moderate; legs short; hair of the body short and rough, a little like hog's bristles, but finer; colour reddish brown above, yellowish below; size of a rather small two-year-old pig, being probably the largest of existing *Rodents*.

The Capybara is confined entirely to the New World, and found in the neighbourhood of the great rivers in Brazil, Guyana, and Paraguay; some say that it is found as high as the Isthmus of Darien.

Marcgrave states that the Capybara lives upon herbs and fruits; that it is a nocturnal animal swimming across rivers and torrents in search of food, and raising such a horrible clamour as to have terrified the narrator before he knew the cause. He says that they wander in infinite congregations about the banks of the rivers, and, as they are slow of foot, that they save themselves from the hunters by swimming, but that, notwithstanding, large numbers are killed. Pennant, who quotes Muratori, says that it runs slowly, swims and dives remarkably well, and keeps for a long time under water, feeds on fruits and vegetables, is very dexterous in catching fish, which it brings on shore and eats at its ease, sits up and holds its prey with its fore-feet, feeding like an ape, takes its food in the night, and commits great ravages in gardens; keeps in large herds, and makes a horrible noise like the braying of an ass.

Marcgrave speaks of the flesh as tolerably good food, especially if it be roasted. The head, he says, is considered a delicacy. Cuvier also says that the flesh is tender and of a good flavour.

For some observations by Professor Owen on the dentition of the Capybara, see 'Proceedings of the Zoological Society,' 1832, p. 187.

HYDROCOTYLE, a genus of plants belonging to the natural order *Umbelliferæ*, and to the suborder *Orthospermeæ*. Upwards of 90 species of plants have been referred to this genus. *H. vul-*

garis is a native of Great Britain and throughout nearly the whole of Europe, in marshy boggy places, and on the margins of rivulets on a peat soil. This plant is commonly called Pennywort, on account of its leaves lying flat on the ground and having the size and form of a piece of money. The notion that it produces disease in animals feeding on it is incorrect; but it occurs in damp places, where animals that feed are likely to be attacked with rot and other diseases.

Of the large number of species of this genus few, if any, are used in the arts or medicine, and none of them are sufficiently ornamental to lead to their cultivation.

HYDROCYANIC ACID, or *Prussic Acid*, probably exists ready-formed in several vegetable products, as the leaves of the cherry-laurel and the peach-tree; but it is generally prepared by the action of hydrochloric acid on bi-cyanide of mercury. It is a colourless liquid, with a strong and peculiar odour; its taste is at first cooling and afterwards burning, and it is extremely poisonous. Its specific gravity is 0·6969; it boils at about 80°, becomes solid at about 5° Fahr., and then crystallises in fibres. As an acid, its powers are but feeble. It is so very volatile that, when dropped on paper, the sudden evaporation of a portion of it renders the remainder so cold that it solidifies; and this effect is produced even when the temperature of the atmosphere is nearly 70°. The vapour of hydrocyanic acid has a specific gravity of 0·9363, air being 1. With water and alcohol it combines in all proportions.

Hydrocyanic acid is composed of H^1, Cyanogen^1. In the state of vapour it consists of equal volumes of those two gases. Neither condensation nor expansion occurs during the combination of the gases which form the acid.

Hydrocyanic acid, especially if it be exposed to light, is subject to spontaneous decomposition. It forms but few salts.

For the medical properties, see PRUSSIC ACID.

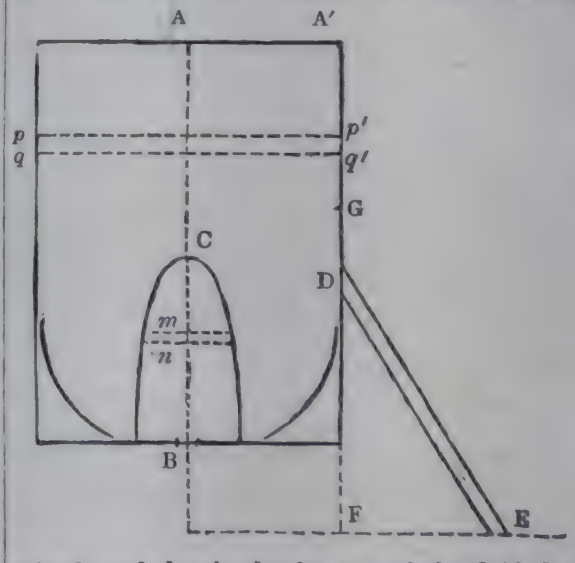
HYDRODYNAMICS. Under this word are usually comprehended the conditions of equilibrium and of motion in non-elastic fluids, with the resistances which they oppose to bodies moving in them. The subject consists chiefly in investigating by mathematical reasoning, or in showing from observation and experiment, the laws relating to the discharge of fluids through orifices and tubes in vessels or reservoirs, and to their motions in canals or rivers.

Concerning the laws of the motions of fluids as they were known to the ancients little can be said; the only notice of this branch of science, even in the time of the Roman empire, is contained in the treatise 'De Aquæductibus,' which was composed by Frontinus, in the reign of Nerva or Trajan. Even at the end of the sixteenth century, the cause of the ascent of water in pumps was little known. Galileo could give no better reason for it than that it was caused by an attraction which he supposed the piston exercised on the water; and we are indebted to Torricellius for the discovery that the rise of the water is owing to the pressure of the atmosphere on the water in the well in which the pump is immersed. The Marquis Poleni wrote, in 1695, a work entitled 'De Motu Aquæ mixto,' and, in 1718, another concerning the flow of water through orifices and short tubes.

The 'Principia' of Newton contains (lib. ii. sect. 7) a series of propositions concerning the motions of fluids, with investigations of the resistance made by fluids to bodies moving in them; and it may be said that his theory forms the groundwork of all our knowledge concerning that subject.

Daniel Bernoulli (in 1738) was the first who applied the higher branches of mathematical analysis in the investigation of general equations relating to the problems of hydrodynamics, and the like was done by D'Alembert in 1744. The researches of Euler, La Grange, La Place, and other continental mathematicians, have since contributed greatly to establish the principles of the science on an analytical basis. The laws of the motions of fluids in canals and rivers were, with every possible precaution to insure accuracy, determined experimentally by the Abbé Bossut in 1771, and by the Chevalier Du Buat in 1786.

In investigating the circumstances attending the discharge of fluids through orifices, it is usual to suppose the fluid to be divided into an infinite number of indefinitely thin laminæ perpendicular to the axis A B of the vessel in which it is con-



tained, and that in the descent of the fluid th se laminæ preserve their parallelism till they co ne near the orifice, when they assume the shape a funnel, about which the fluid is stagnant. Let the vessel be cylindrical or prismatical, in a vertica position, and have an orifice whose height is C B. Now, if $p\ p'\ q\ q'$ be a vertical section through such a lamina, its area perpendicular to the axis be ne represented by a, and if a' be the area of the orifice C B; also, if g express the force of gravity, h the height A B, and, u the velocity of a particle o fluid at the bottom of the orifice; then the rel tion between the velocity u and the height h may be found from the equation

$$0 = -\frac{a'^2}{2a^2}u^2 - gh + \tfrac{1}{2}u^2;$$

or considering the orifice as infinitely small, s that a' and the whole first term of the second member vanishes, we have $0 = -gh + \frac{1}{2}u^2$, whence $u = \sqrt{2gh}$.

Now gh expresses the weight of a prism of fluid having unity for the area of its base and whose height is h; and this is the pressure of the fluid against a small orifice at the bottom of the vessel: but, while the height h is the same, the pressure is the same whatever be the position or inclination of the orifice; therefore $\sqrt{2gh}$ will express the velocity at the same depth, whether the orifice be at the bottom or side of the vessel. By the theory of forces this is equal to the velocity acquired by a body in descending by gravity through a height h, equal to that of the column of fluid, the orifice being infinitely small.

It may be concluded from the above value of u that the velocity of a fluid, spouting upwards through an orifice in a vessel, would cause it to ascend to the level of the upper surface of that in the vessel, if the resistance of the air were abstracted.

It follows also that the velocities of spouting fluids, at different depths below the upper surface, are proportional to the square roots of the depths; that the quantities of fluids discharged in equal times at different depths in the vessel, the latter being constantly full, are to one another in a ratio compounded of the areas of the orifices and the square roots of the depths; and the quantity of water which would be discharged in a given time t, through an orifice a in a vessel kept constantly full at the height h, is expressed by $a' t \sqrt{2gh}$.

The velocity u or $\sqrt{2gh}$ expresses the length of a cylinder of water which would flow through the orifice in one second; consequently the time of discharging from a cylindrical or prismatical vessel, the area of whose base is a and whose height is h, a quantity of water equal to that which the vessel will contain, the latter being however kept full during all the time that the water is flowing, will be found by making ah equal to $a' t \sqrt{2gh}$; whence t (the time required) $= \frac{a}{a'}\sqrt{\frac{h}{2g}}$. The value of g is 32·167 feet, or 386 inches; and in these values of u and t it is evident that the areas and height must be of the same denomination as g.

When a vessel is suffered to discharge itself gradually, the velocity of the effluent water diminishes continually; and, if the vessel be an upright cylinder or prism, the time (t) in which the vessel would be completely emptied will be obtained, the orifice being small, from the equation $t = \frac{a}{a'}\sqrt{\frac{2h}{g}}$; and comparing this with the above value of t, or the time in which an equal quantity would run off, the vessel being kept full, it would be found to be double the latter.

Next, if it were required to determine the quantity of water which would flow through an orifice of finite magnitude when cut in the vertical side of the vessel which is kept constantly full, it must be observed that the velocity of the effluent fluid at different points in the depth of the orifice varies as the square root of the distance of the point from the upper surface. Now let A B ($=h$) be the vertical height of the water in a vessel in one side of which is formed the orifice whose axis is C B ($=h'$), and let the interval between the parallel lines m, n represent a vertical section through an indefinitely thin lamina of the effluent water. Then, if the orifice were rectangular, and its breadth were represented by b, the quantity of fluid discharged through the orifice in the time t would be

$$\tfrac{2}{3} b t \sqrt{2g}\,(h^{\frac{3}{2}} - h'^{\frac{3}{2}}):$$

and if the orifice extended from the bottom to the top of the vessel, having then $h' = 0$, the expression would be $\frac{2}{3} b t \sqrt{2g h^3}$. If a rectangular orifice of the same form and magnitude were situated at the bottom B, with its longer side ($=h$) horizontal, the breadth b being very small in this, and also in the preceding case, the quantity discharged in the same time t, the velocity of the effluent water being now equal in every part of the orifice, and being that which is due to the whole height h, would be expressed by $b t \sqrt{2g h^3}$. The discharge found above is manifestly equal to two-thirds of this quantity.

In the second book of the 'Principia,' Newton shows that many of the particles of water, previously to issuing from an orifice in a vessel, converge towards the orifice in every direction; so that after passing it they form a stream of diminished breadth, which he called the *vena contracta*. By careful measurement he found the diameter of the latter and that of the orifice to be to one another in the ratio of 21 to 25; and he infers that the velocity in the contracted stream must be to that at the orifice inversely as the squares of those numbers, that is, nearly as $\sqrt{2}$ to 1. Hence, finding from experiment that the velocity in the said stream was equal to that which a body would acquire by falling through the whole height of the fluid column in the vessel, he concludes that the mean velocity in the orifice must be that which is due to half the height of the same column. In practice, when water is made to flow through a small orifice in a thin plate, it is found that the quantity discharged in the time t may always be represented with sufficient accuracy by the expression $0{\cdot}62at\sqrt{2hg}$, a being the area of the orifice.

The results of experiments tend to show that, when the height of a head of water in a vessel and the diameter of an orifice in its base or side are given, the discharge of water through a tube inserted in the orifice (its length not exceeding three or four times its diameter) is to that through the simple orifice nearly in the ratio of 12 to 11; and it is observed that, with a given diameter at its farthest extremity, the tube which is formed to coincide as nearly as possible with the natural figure of the *vena contracta* affords the greatest discharge.

It is customary to express the slope or inclination of a pipe or canal, when uniform, by the quotient arising from the division of the vertical height of one end above the other by the whole length. But, in the case of a reservoir, as A B, having a conduit-pipe D E; let A A′ be the sur-

face of the water, and E, in the horizontal line F E, be the lower orifice of the pipe. Then, if A G expresses the height due to the observed velocity at E, G F will be the height necessary to overcome the friction in the pipe, and $\frac{G F}{D E}$ is considered as the effective slope.

The passage of water through long pipes is greatly retarded by adhesion and friction in the interior; by the resistance experienced where bends take place; and by the disengagement of air. The general rules deduced from the experiments of the Abbé Bossut at Mezières, in 1779, are—that the discharges in given times, with pipes of the same length and with the same head of water, are proportional to the squares of the diameters; and, when the diameters are equal, the discharges are inversely proportional to the square roots of the lengths of the pipes. A pipe whose length was 600 fathoms, and which was 12 inches in diameter, when the head of water was 12 feet, afforded a discharge amounting to about $\frac{1}{10}$th; and a pipe of equal diameter, whose length was 2340 fathoms, when the head of water was 20 feet, discharged only $\frac{1}{19}$th of that which would have been obtained from a simple orifice.

The orifice or pipe through which water is allowed to flow is called *adjutage*; and it may be mentioned here that, by writers on hydrodynamics, short pipes applied as above are denominated *additional pipes*.

If the water of the river experienced no resistance from the sides and bed, its motion would go on continually accelerating from its source to its mouth, like a solid body falling by the action of gravity; and the consequences would be, that, besides the destruction ensuing from the violence of the torrents in the lower lands, the moisture would be drawn from the soils in the upper regions, which would thus become incapable of supporting vegetable and animal life. The adherence of the particles of water to each other, and the friction against the beds, produce a resistance which increases with the velocity of the current, and becomes at length equal to the accelerative force of the descent; and then a uniform motion is established.

But, when a current is in a state of equilibrium, the velocities in different transverse sections of the river may be very unequal, on account of the variations in the areas of those sections, through all of which the same quantity must flow in the same time; since otherwise the equilibrium of the river would not be permanent. It follows that the products of the areas of the sections multiplied by the velocities in each must be equal to each other, and that the velocities in different sections must be inversely proportional to the areas of those sections.

The mean velocity of water in a river may be expressed approximatively by the formula

$$307 \sqrt{\frac{r}{l}}$$

in which r, commonly called the mean radius, is in inches, the quotient arising from a division of the area of a transverse section of the river by the

breadth, the latter being measured on the surfa of the bed; and l is in inches the extent of a po tion of the river, between two points in its lengt whose difference of level is one inch. And by e periment it has been found that, if v' = the velocit at the surface of the river, v'' the velocity at th bottom, and v the mean velocity as above (all bein expressed in inches per second), we shall have

$$v' = (\sqrt{v''} - 1)^2 \text{ and } v = \tfrac{1}{2}(v' + v'').$$

The mean velocity in any one section may b practically found, tolerably near the truth, b placing in it a rod of wood loaded at one end wit a weight sufficient to allow it to float upright i still water. The greater velocity at the upper su face will make the rod incline towards the dire tion of the stream; and, consequently, when it ha acquired a state of equilibrium, it will float in a oblique position; the top of the rod will mov slower than the water at the upper surface of th river, and the bottom will move faster than tha in the lower part. Hence, the mean velocity the water in that part of the breadth of the rive may be considered as nearly equal to the observe velocity of the rod.

A knowledge of the velocity at the bottom of river is of considerable use in enabling the hydraul engineer to judge of the action of the stream on i bed; and it is evident that, to insure permanenc the accelerative force of the water should be equilibrio with the tenacity of the channel. It stated that a velocity of 3 inches per second at t bottom will remove fine potter's clay: a veloci of 6 inches will lift fine sand; that of 12 inch will sweep away small gravel; 24 inches will r away rounded pebbles; and 3 feet per second w carry along angular stones of the size of an eg Bossut found that, when the velocity of the strea was just sufficient for lifting the sand, a ridge a vanced about 20 feet in a day.

When a body moves in a fluid at rest, its anter surface being perpendicular to the direction of t motion, if an indefinitely thin lamina of fluid supposed at every successive instant of time to displaced, the resistance experienced by the m ing surface may be considered equal to the wei of a column of the fluid whose base is the sur pressed, and whose height is that which is d to the velocity; that is to say, the resista may be supposed to be equal to the press which would produce the same velocity at orifice in the base or side of a vessel. Therefo if the velocity be represented by v, the he due to that velocity is equal to $\frac{v^2}{2g}$; then a re senting the area of the moving surface, and D specific gravity of the fluid, we shall have $\frac{a}{2}$ for the pressure against that surface, or the re ance experienced by it, in moving through fluid. But, when the anterior surface of the mo body is oblique to the direction of the mot the resistance above found must be diminishe account of the inclination. If the number of f filaments which act against the surface is const the above expression must be multiplied by square of the sine of the inclination; if vari

y the cube of the sine of the inclination, in order
have the effective pressure against the oblique
rface.

If a cylindrical body, terminated in front by an
uilateral cone, move through a fluid in the direc-
n of its axis, it can easily be shown that, in
ory, the resistance experienced is one-fourth,
d, if the body be terminated in front by a hemi-
here, the resistance is one-half, of that which
ould be experienced by the same cylinder if it
ere terminated in front by a plane perpendicular
its axis.

The circumstances attending the resistances ex-
rienced by bodies of various forms and lengths,
ven caused to move in water, have, within a few
ars, been made the subject of numerous experi-
nts which were carried on by the late Colonel
ortley in the Greenland Docks. Ample details
these valuable experiments are given in a
lume published in 1834; and the following
e some of the results:—

The fraction of bodies moving in water is equal
a power of the velocity whose exponent is 1.943.

The pressure sustained at the head-end varies in
ther a higher ratio than the square of the velocity,
en the velocity is small, and the exponent
creases with an increase of velocity.

The diminution of pressure on the stern, caused
the fluid not pressing so strongly there when
body is in motion as when at rest, varies in a
wer degree than the square of the velocity; and
exponent diminishes with an increase of ve-
city.

A globe experiences about one-third of the resist-
ce which is encountered by a cylinder.

A globe cut in halves, and separated by the in-
rvention of a cylinder whose base and length are
ch equal to a diameter of the former, experiences
diminution of resistance which, compared with
at of a complete globe, is nearly equal to one-
th of the latter.

Bodies whose head-ends are formed with curve
es have great advantage in respect of resistance
er those formed with right lines.

The greatest breadth of a moving body should
at a distance from the head extremity equal to
fifths of the body's length, that the body may
ve through the water with the least resistance.

Increasing the length of a solid of almost any
m by the addition of a cylinder in the middle
arly diminishes the resistance with which it
ves, provided the weight in water continues to
the same.

By comparing the resistance of bodies near the
rface with those having similar head and stern
ds, and which were immersed to the depth of
feet, those at the surface were found to expe-
nce more retardation than the others.

HYDROFLUORIC ACID, a compound of
orine and hydrogen, which was first made
own by Scheele. The properties of this acid
, that it is fluid, clear, colourless, and volatile;
l, when it escapes into the air, which it does at
ut 60°, it forms with the moisture of it white
es. Its vapour is extremely pungent and irri-
ng, and it acts strongly on vegetable blues.
e specific gravity is 1.06. It acts upon and
decomposes glass with great facility, on account of
its affinity for the silica which it contains. And
hence it has, to a certain though not to a very
useful or ornamental extent, been employed to en-
grave on glass. It is supposed to consist of H¹
F¹. When the acid is brought into contact with
certain metals it is decomposed, hydrogen gas
being evolved, and a metallic fluoride formed.
With metallic oxides it forms a fluoride and water.

HYDROGEN, an elementary gas, the lightest
of all known bodies. It may be obtained in several
modes, but it is usually procured by the decom-
position of water, by causing some substance to act
upon it which has affinity for its oxygen and none
for the hydrogen, so that this element is separated,
and assumes the elastic or gaseous state.

The properties of hydrogen gas are, that it is
colourless, inodorous, insipid, and it has resisted
all attempts which have been made to condense it
by the united agency of cold and pressure. 100
cubic inches weigh only 2.15 grains. It refracts
light powerfully: by heat it is merely expanded,
and suffers no change by the action of electricity,
and in electrical decompositions of its compounds
it is evolved at the negative pole. This gas ex-
tinguishes flame by itself; but, when it meets with
a supporter of combustion, as oxygen, it burns
readily, and with a continuous but feeble flame,
and much heat. When mixed with oxygen, a
taper causes immediate and loud explosion, at-
tended with the formation of water by the com-
bination of the gases. It is irrespirable for any
length of time.

It is very sparingly soluble in water, 100 cubic
inches taking up only about one inch and a half of
the gas. Hydrogen, neither in the gaseous state
nor in solution, possesses either acid or alkaline
properties. When mixed with oxygen gas, and
the mixture gradually burned into a small jet, in-
tense heat is generated. When a very small jet
is burned, the flickering nature of the flame causes
musical sounds when a tube of glass or metal, or
even of paper, is held over it. Its atomic number
is the foundation of the scale of chemical equiva-
lents, being = 1.

Hydrogen unites with all other elementary
gaseous bodies, and forms with them compounds
of vast importance and utility: thus with oxygen
it forms water; with nitrogen, ammonia; with
chlorine, hydrochloric acid; with fluorine, hydro-
fluoric acid. It combines with bromine to form
hydrobromic acid. By its union with several non-
metallic solids, as with carbon, iodine, phosphorus,
selenium, and sulphur, it forms compounds of very
different properties; for an account of these we
refer to the substances above named, except those
which it forms with carbon, and which will be now
considered under the head of

Carburets of Hydrogen.

The compounds of carbon and hydrogen may
be divided into four classes: the gaseous, liquid,
solid, and hypothetical.

Gaseous Carburets.

Carburetted Hydrogen Gas is frequently pro-
duced in coal-mines, and called Fire-Damp. When
mixed with air and exposed to flame it occasions
dreadful and destructive explosions. It is also

generated in stagnant pools by the action of the carbon of decomposing vegetable matter upon water. Carburetted hydrogen gas is colourless, nearly inodorous, and insipid. Water absorbs about 1-60th of its volume. It is fatal to animals, extinguishes flame, but is highly combustible when it meets with a supporter of combustion, and extremely explosive when mixed with it. It burns when a taper is applied to it in contact with the air with a yellow flame, and on account of the carbon which it contains it yields much more light during combustion than pure hydrogen gas. 100 cubic inches weigh very nearly 17.2 grains. Its specific gravity, compared with air, is 0.554. It consists of 4.3 grains of hydrogen gas combined with 12.9 grains of carbon. It is composed of C^1 H^2.

Olefiant Gas, or *Bicarburetted Hydrogen*, is prepared by mixing in a retort three volumes of sulphuric acid and one volume of alcohol: when heat is applied decomposition readily takes place. It is a colourless elastic fluid: when pure it has but little odour and is tasteless. It is soluble in about eight times its bulk of water; it is destructive of animal life, is not inflammable unless a supporter of combustion be present, and then it burns with a dense white light, or, if mixed with air, it explodes with great violence on the contact of flame. 100 cubic inches weigh 30.1 grains. It consists of C^2 H^2.

Chloride of Hydrocarbon is a colourless volatile liquid; odour æthereal, taste sweetish, insoluble in water, specific gravity 1.2, that of its vapour 3.4 (air = 1), boiling point about 150° Fahr., burns with a green flame, depositing charcoal, and evolving hydrochloric acid. It is composed of Olef.^{1} Chl.^{1}

Iodine and Olefiant Gas combine to form *Iodide of Hydrocarbon*, or *Hydriodide of Carbon*. It is a solid, colourless, crystalline body, has an aromatic odour, a sweetish taste, and is very dense; neither water nor acid or alkaline solutions act upon it. It consists of Olef.^{1} I^1.

Bromine and Olefiant Gas unite to form *Bromide of Hydrocarbon*. It is fluid, colourless, very volatile, has a penetrating æthereal odour, and a very sweet taste. It is heavier than water, very slightly soluble in it; at about 22° Fahr. it becomes solid. It consists of Olef.^{1} B.^{1}

Liquid Carburets of Hydrogen.

These are very numerous. Those which we shall first describe are all composed of six of carbon and one of hydrogen by weight.

Caoutchen, obtained by subjecting caoutchouc to distillation. It is a colourless fluid, and has a peculiar and æthereal odour; specific gravity 0.666. It remains liquid at 14° Fahr. and boils at 582°.

Ceten, procured by distilling ethal with anhydrous phosphoric acid. It is a colourless oily liquid, which boils at 527°: the density of its vapour is 7.884.

Elean, an oily liquid obtained by distilling metaoleic and hydroelaic acids. It boils at 230°, and the density of its vapour is 4.488.

Etherine, a highly volatile liquid. [Etherine.]

Eupion. [Eupion.]

Heveen, obtained by the distillation of caoutcho with sulphuric acid. It is a comparatively den fluid, its specific gravity being 0.921, and it bo at 579°.

Naphtha.—This is a colourless, limpid, ve volatile liquid, with a strong peculiar odour. I specific gravity is 0.753; it boils at 176° to 212 the density of its vapour is 2.833: it remai liquid at 0°. It is insoluble in water, but co bines in all proportions with alcohol, æther, petr leum, oils, and sulphuric acid. It is very inflar mable, and burns with much smoke.

Olein, procured by distilling metaoleic ar hydroelaic acids. It is a fluid which boils 131°, and the density of its vapour is from 2.8 to 3.02.

Benzine. [Benzine.]

Volatile Oils.—Oil of copaiva, juniper, lemon black pepper, savin, and turpentine, are all form of C^{10} H^8

Solid Carburets of Hydrogen.

Hatchetine. [Hatchetine.]

Ozocerite.—This substance is soft, unctuou gives a greasy stain to paper; semi-transparen by transmitted light, of a brownish-yellow colou by reflected light, yellowish-green and opalescen odour slight fatty, which is more perceptible wh melted. It fuses at 140° Fahr., attains its greate fluidity at about 160°, and begins to boil at 25

Paraffin, at common temperatures, is a fatty b rather firm solid; it is tasteless, inodorous, and density is 0.87; at 111° Fahr. it melts into oily liquid, and evaporates without change; burns with a pure white flame.

Solid Oil of Roses is crystalline, and becom liquid at 95°, and boils at 536° to 572°.

Idrialin is solid, insoluble in water either c or hot; it imparts to sulphuric acid a beauti blue tint.

Naphthalin is solid, colourless, and crystalli when quite pure it is nearly inodorous, but generally a disagreeable odour; its taste is pung and somewhat aromatic; it is unctuous to the tou heavier than water, in which it is insoluble wh cold, and only slightly dissolved if hot. It fu at about 180° to 200°, assumes a crystalline t ture on cooling, volatilizes slowly at common t perature, and boils at 410° Fahr.

Chlorine and Naphthalin combine to form solid and a liquid compound. The solid chlorid insoluble in water, and nearly so in alcohol melts at 320°, but it may be distilled unchan The liquid chloride has a light yellow colour oily appearance, is heavier than water, and soluble in it.

Paranaphthalin is supposed to be a mixtu naphthalin and paraffin.

Caoutchouc. [Caoutchouc.]

Hypothetical Carburets of Hydrogen.

These are such as have never been obtained separate state, but which are considered as pound radicals or bases. *Ethyl* or *Ethule* is of the number. [Ethyl.] Another, suppose be the basis of pyroxilic spirit, is called *Meth* It is observable that some of these compounds naphthalin ethyl, and more especially meth act the parts of alkalis, by combining with

saturating acids, and producing crystalline salts with them; and it is a curious circumstance that methylen, which is a theoretic carburet, appears to possess the most extensive power of combination: indeed it may perhaps be on this very account that it has not yet been isolated.

It is scarcely possible to enumerate all the various compounds of carbon and hydrogen; the progress of organic chemistry is increasing the number every year.

HYDROLEA'CEÆ, a very small and unimportant natural order of monopetalous exogenous plants, allied to *Convolvulaceæ*, with which they were once united. They are weeds inhabiting the East Indies, with alternate glandular or stinging leaves, monopetalous regular flowers, with a gyrate inflorescence, definite stamens, a superior polyspermous 2- or 3-celled fruit, and seeds with the embryo lying in the midst of fleshy albumen. In their gyrate inflorescence they correspond with *Boraginaceæ*.

HYDRO'METER (ὕδωρ, water, and μέτρον, a measure) is an instrument for determining the relative densities or specific gravities of fluids. The principle of the hydrometer is this:—It is known that when a body is immersed in a fluid it loses as much of its weight as is equal to the weight of that portion of the fluid which it displaces. Hence, if the same body be immersed successively in two different fluids, the portions of weight which it will thereby lose will be directly proportional to the specific gravities of those fluids. The body in this case is supposed to be specifically heavier than the fluid. If it be lighter it will float upon the surface, so that its tendency to descend, or its weight, will then be entirely counteracted by the fluid; from which it appears that, when a body floats upon the surface of a fluid, the weight of the portion of fluid displaced is equal to the entire weight of the body. Now, since the weight of the fluid displaced by a floating body is constant (being always equal to the weight of the body), whatever may be the density of that fluid, it is obvious that if we can determine how much of the body is immersed we may immediately deduce the specific gravity of the fluid; because, when the weight is constant, the specific gravity varies inversely as the bulk.

Upon this principle is constructed the well-known instrument called Sykes's Hydrometer, which is now employed in the collection of the spirit revenue of Great Britain. It consists of a thin brass stem about six inches in length, passing through and soldered to a hollow ball of the same material, and about one inch and a half in diameter. To the inferior extremity of the stem, from which the hollow ball is about one inch distant, a permanent pear-shaped weight is attached; so that, when the instrument is placed in a fluid, the other extremity may float perpendicularly to the surface. There are also ten weights of different magnitudes, nine of which are circular, and one in the form of a parallelopiped. By the successive application of these weights the instrument may be sunk so as to obtain the complete range of specific gravity, from that of pure alcohol to that of distilled water.

The most convenient method of obtaining the specific gravities of fluids is by means of what chemists call a 'thousand-grain bottle.' This is a bottle of a globular form, with a ground glass stopper, so adjusted as to contain exactly 1000 grains of distilled water, at the temperature of 60° Fahr., and accompanied by a weight, which is an exact counterpoise for the bottle when thus filled. In order to determine the specific gravity of a fluid by this means, it is simply necessary to fill the bottle with that fluid at the temperature of 60°, and place it, together with the adjusted weight, in the opposite scales of a delicate balance; then the number of grains which it will be found necessary to add to one of the scales, in order to produce equilibrium, will be the difference between the specific gravity of the fluid and that of water, taken at 1000.

HYDROMETRIDÆ, a family of insects, belonging to the order *Hemiptera*. This family was established by Dr. Leach, and is thus characterised:—Rostrum with two or three distinct joints; labrum very short; eyes moderate; feet very long, formed for walking on the water, with the claws minute, inserted laterally into a fissure on the extremity of the terminal joint of the tarsus.

The genera *Hydrometra*, *Gerris*, and *Velia*, of Latreille belong to this family. Those species which have cetaceous antennæ, the head prolonged into a snout and receiving the rostrum beneath, belong to the first of these three genera, of which the *Hydrometra Stagnorum* will serve as an illustration.

HYDROMYS. [MURIDÆ.]

HYDROPHI'LIDÆ, a family of coleopterous insects established by Leach. The insects of this family are included by Latreille in his section *Palpicornes*. They have generally nine joints to the antennæ, but sometimes only six; the terminal joints always form a perfoliated knob; the maxillary palpi are very long and slender; the body is usually oval or rounded, convex above and flat beneath, or nearly so: the tarsi are five-jointed, and the mandibles bidentate.

The principal genera are *Hydroüs*, *Hydrophilus*, *Spercheus*, *Berosus*, and *Hydrobius*.

HYDROPHO'BIA (from ὕδωρ, water, and φόβος, fear) is the disease occasioned by inoculation with the saliva of a rabid animal, and is so called from the violent and suffocating spasms of the throat which occur when the patient attempts to drink, or when, in the latter stages, the mere idea of drinking arises in his mind. The disease is never produced in man by any other cause than the saliva of a rabid animal. It is probable that all animals are subject to hydrophobia, for all that we have an opportunity of observing, that is, all our domestic species, are; but it has not appeared that any, except the wolf, fox, cat, and dog, are capable of communicating it to each other, or to other species.

The disease may be communicated to man either by the saliva being carried into a wound made by the tooth of a rabid animal, or by its being placed on the surface of a previous wound, as where dogs have licked the hand or face of a person in which there was any raw surface. If a mad animal bite

through the clothes, there is great probability that all the saliva will be wiped off from its teeth as they pass; and hence wounds of the hands and face are generally the most dangerous.

The period after the inoculation at which the symptoms of hydrophobia may exhibit themselves varies greatly. In general the disease appears between the thirtieth and fortieth days from the injury; but cases are known where it has been delayed for several months. The bite of a rabid animal generally heals up like that of a healthy one, and the patient is attacked when he had forgotten that he was ever bitten. In some cases however, before hydrophobic symptoms appear, the scar of the wound becomes painful, red, and swollen, and pain is felt shooting from it along the course of the nerves of the part, as if it were going to ulcerate. The first decided indication of the disease is that the patient has headache and general uneasiness; he loses his appetite, and when he is about to drink he suddenly feels an aversion to any liquid, and finds a difficulty in any attempt to swallow it. The symptoms rapidly increase in severity: any attempt to drink, and even anything that can suggest the idea of drinking, is sufficient to bring on the most frightful spasms of the throat, threatening instant suffocation, and producing the most severe pain. The convulsions, which were at first limited to the muscles of the throat and of deglutition, after a short time extend to other parts of the body. As the disease proceeds, the convulsions of the throat become more frequent and severe; the slightest noise or vibration of the room is sufficient to excite them; there are severe headache, a rapid pulse, a foul tongue, and other symptoms of a generally disordered condition of the system. A copious secretion of thick tenacious mucus clogs up the air passages, and it is in his attempts to free himself from this that the patient coughs and makes a loud harsh noise, which has been supposed to resemble the barking of a dog. Sometimes there is furious delirium, but often for the last few hours of life the patient becomes quiet; he then rouses from his tranquillity, and, after one or two comparatively slight convulsions, expires. The duration of the disease is very rarely more than six days, and it often terminates fatally in twenty-four hours.

No method of cure has yet been devised for this terrible disease, and the only question that can be satisfactorily considered is that of prevention, which can only be accomplished by the removal of the morbid saliva from the wound before it has had time to produce its fatal influence on the body. Excision is at once the safest and most simple means, and should be employed as early as possible; the parts bitten should be completely cut out, with some of the sound tissues around them, and care should be taken that the very bottom of the wound is removed; for if a portion of the wounded surface remain, the patient is not secure. In some cases however, as where the wound is superficial but extensive, or where it is situated on the face, or near an important organ, excision may be deemed unadvisable, and in these cases the best application is some strong caustic: pure nitric acid, or fused potash, or nitrate of silver, should be applied freely over the whole surface of the wound, so as to decompose every particle of the saliva. Careful washing of the wounds should always be diligently employed until medical assistance can be obtained.

HYDROPHYLLA'CEÆ, a natural order of exogenous plants. It is near *Boraginaceæ*, but differs in the structure of its seeds and fruit. Many of the species, especially those of the genera *Nemophila* and *Eutoca*, are beautiful objects: they are all natives of North America.

HYDROPS PERICARDII, or *Hydropericardium* (from ὕδωρ, water, and περικάρδιον, the pericardium), is a collection of an unnatural quantity of fluid in the sac containing the heart.

HYDROSTATIC BED. [BEDSTEAD.]

HYDROSTATICS is the science which relates to the pressure and equilibrium of the fluids commonly called non-elastic, or incompressible; as water, mercury, &c., and to the equilibrium of bodies immersed in them. The elastic fluids, as air, steam, &c., are the subjects of Pneumatics.

The cause of fluidity in bodies has been the subject of much discussion; it has been supposed to depend on the globular form of the particles, on the caloric contained between them, or on both these circumstances combined. But, whatever may be the primary cause, it is admitted by all that the property must arise, immediately, from the perfect mobility of the particles among one another. Differences however exist in the fluidity of different bodies. Such as mercury, water, &c., in their ordinary state, possess this property in a high degree; while the particles of many fluids, as the oils, have a sensible adhesion to one another. Except pure alcohol, all the non-elastic fluids, at certain temperatures, become congealed, and thus entirely lose their fluidity.

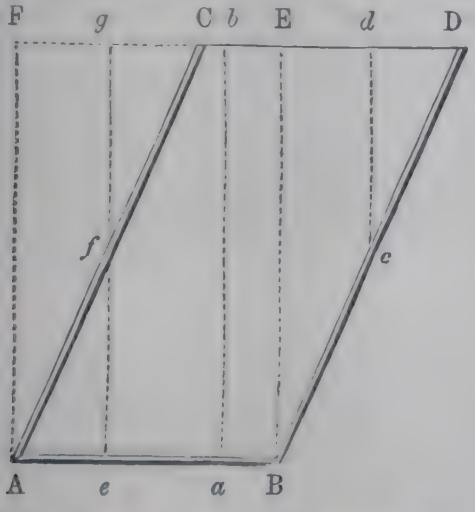
Since pores are known to exist between the particles of all bodies, fluid as well as solid, it may readily be conceived that no fluids can be absolutely incompressible; and experiments have been made from which it is manifest that spirit of wine, oil, water, and even mercury, can, by pressure, be reduced in volume, in certain degrees the fluids which have the greatest specific gravity suffering the least compression. But as this diminution is very small when compared with the volume of the fluid (being for water, according to the experiments of Mr. Canton ('Phil. Trans.' 1762, 1764), only $\frac{1}{21740}$ part of the volume when the pressure is equal to that of the atmosphere in its ordinary state), for all practical purposes of hydrostatics such fluids may safely be considered as experiencing no change of volume by the compressions to which they may become subject.

Experiment has also shown that all the non-elastic fluids possess the property of transmitting equally in every direction the pressure exerted against any point on their surface. If, for example, a piston were forced into an orifice made in any part of the side of a vessel containing such a fluid, the effect of the pressure would be experienced equally at every point on the whole surface of the vessel; but the pressure thus exerted must be distinguished from that which is caused by the

gravity of the fluid; the former being the same in every part of the fluid mass, while the latter, at every point in the sides, depends on the depth of the point below the upper surface of the fluid.

If a fluid at rest in a vessel be supposed to consist of an infinite number of filaments, or infinitely slender columns in vertical positions, the pressure which, in consequence of the weight of the particles vertically above, is exerted in every direction by any particle of one filament will be counteracted by the equal pressure of all the surrounding particles, so that the filament will remain at rest, and act by its gravity on the particle vertically under it. Also, the pressure exerted by the fluid against every part of the surface at the sides or bottom of the vessel containing it, will, while the fluid is at rest, be perpendicular to the surface; since, otherwise, the reaction of the surface could not entirely destroy that pressure, and a part of it would disturb that equilibrium which, by hypothesis, is the condition of the fluid in the vessel. The amount of that reaction at an infinitely small element of the surface is, of course, equal to the weight of any one of the vertical filaments comprehended between the upper surface of the fluid and a hofizontal plane passing through the elementary surface pressed. The pressure of all the particles in the upper surface of the fluid is evidently nul.

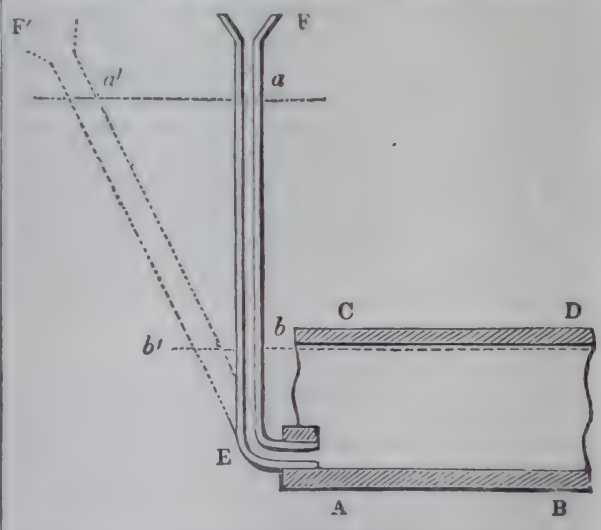
It may hence also be proved, that the pressure on the base of any vessel containing a fluid will be the same whatever be the form or position of the sides of the vessel, provided the fluid have always the same height above the base. For, let A B C D be a vertical section through a



prismatical vessel; the pressure on any point a of the base is evidently equal to the weight of the vertical filament ba; that on any point c of the inclined side B D is the weight of the filament cd; and this last produces no effect on the base, because the lateral pressures of all the particles in every verticle filament are counteracted by those of the particles in the neighbouring filaments. The same thing must be understood of all the water in the portion E B D. The pressure on any point e under the inclined side A C is equal to the weight of the filament ef, together with the pressure arising from the reaction of the side A C at f, in the vertical direction fe; and this reaction is, from what has been said, equal to the weight of a filament which may be supposed to exist above f, with a height equal to fg. Consequently, the pressure on A B, when the sides of the vessel are inclined to the horizon, will be equal to that upon the same base when the sides are in vertical positions. This is the foundation of the experiment usually exhibited in popular lectures, when columns of water of equal height, in cylindrical and conical vessels, having equal bases, but of course containing very different quantities of the fluid, are shown to be in equilibrio with one and the same weight applied to prevent the moveable bases from descending.

It may readily be inferred from the above that the pressure on the base will be equal to the weight of a vertical prism or cylinder of the fluid, whose base is that of the vessel, and whose altitude is that of the fluid which it contains, whatever be the form or inclination of the sides.

On the same principle may be explained the experiment which has been denominated the hydrostatical paradox. In this is employed a cylindrical machine formed of two circular plates of wood, as A B and C D, with sides of leather like those of a pair of bellows. A tube F E is in-



serted in an orifice near the bottom, and through this tube water is poured into the cylinder, till the boards A B and C D are at any distance asunder within the limits allowed by the leathern sides. Then, if any weight be placed on the board C D, it will cause the water to rise in the tube E F to a certain height, suppose a; and the weight of the small column ab of water may be considered as holding in equilibrio the weight applied on C D; which will, in fact, be found to be equal to that of a cylinder of water whose base is the area of the board C D, and whose height is equal to ab.

If the tube E F were made to decline from the vertical so as to take any oblique position E F′, it would follow, since a pressure of a fluid by gravity depends on the vertical height only of the column, that the fluid in the tube, from the same pressure on C D, would rise till its upper surface is in a horizontal plane aa' passing through a: and the weight of the column of fluid must be estimated by the area of the horizontal section at b' multiplied by the vertical height of a' above b'.

The pressure exerted by a fluid against the side of a vessel containing it, or against a surface

immersed in it, whether that side or surface be plane or curved, is, by the theory of parallel forces, equal to the weight of a column of the fluid having the surface pressed for a base, and the distance of the upper surface of the fluid from the centre of gravity of the former surface for its altitude. By this theorem the pressure of water against the walls of reservoirs, lock-gates, &c., may be determined; and from it may be found the relation between the weights of the fluid in vessels of various forms and the pressures against the sides. (See Vince's 'Hydrostatics,' Gregory's 'Mechanics,' &c.)

The centre of pressure in any surface, subject, like the side of a vessel containing a fluid, to the hydrostatical pressure of the fluid, is that point at which, a force being applied in a direction contrary to that of the pressure, the surface will be kept in equilibrio; and in all cases, when the surface pressed is symmetrical on each side of a line joining the centres of gravity and pressure, the latter coincides with the centre of percussion in mechanics.

If the surface is rectangular, the centre of pressure is at a distance from the upper surface of the fluid equal to two-thirds of the depth of the fluid. When a triangle in a vertical position is pressed by a fluid, its vertex coinciding with the upper surface of the latter, and its base being horizontal, the distance of the centre of pressure from the vertex is equal to three-fourths of the perpendicular of the triangle. And when a circle in a vertical position is so pressed, its upper part just touching the surface, the distance of the centre of pressure from that part is equal to five-eighths of the diameter.

The equality of the pressures in every direction, at any point in a fluid mass, is the cause that, if a solid body were plunged in a fluid, the pressure of the fluid immediately under it will tend to raise the body upwards with a force equal to the weight of the fluid displaced. But the weight of the body is a force acting vertically from above downwards, and, consequently, in an opposite direction to that caused by the reaction of the fluid. Since therefore the volumes of the body and of the displaced fluid are equal to one another, if their weights or densities should be equal, the body would remain in equilibrio in whatever situation it were placed in the fluid. But, should these weights or densities be unequal, the body would make an effort to ascend or descend, according as its density is less or greater than that of the fluid; and, in order to counteract these tendencies, it would be necessary to use a force equal to the difference between the weight of the body and of the displaced fluid. Hence, if a solid body be weighed in a fluid, it will be found that its weight, compared with that of the same body in vacuo, will be less than in the latter case by the weight of an equal volume of the fluid; and, consequently, when a body is weighed in a fluid, as water or air, the true weight, or that which would be obtained in vacuo, will be found by adding to the observed weight that of an equal volume of the fluid.

'When a body floats in a fluid, in order to bring its upper surface to coincide with that of the fluid, it must evidently be loaded with a weight equal to the difference between the weight of the body, or of the displaced fluid, and the weight of a volume of the fluid equal to that of the whole body. The weight which a floating body will thus bear is denominated the buoyancy of the body; and on the principle here stated depend the common rules for finding the buoyancy of rafts, vessels, &c.

If a solid body float in equilibrio in a fluid, the centres of gravity of the body and of the displaced fluid must evidently be in one vertical line; otherwise the upward action of the fluid below, which necessarily has its resultant in a vertical line passing through the centre of gravity of the place occupied by the body, would produce in the latter a rotatory motion contrary to the hypothesis. Hydrostatical equilibrium is of three kinds:—If the centre of gravity of the body should be below that of the displaced fluid, the body is said to possess a stable or firm equilibrium; if above, the body is said to float with a tottering equilibrium; and, if the said centres should exactly coincide, the body would float in any position whatever, and is denominated an equilibrium of indifference.

The absolute weight of a given volume of any solid or fluid body is called its specific gravity. In this country, for convenience, it is customary to consider one cubic foot as the given volume, and to express the weight in avoirdupois ounces; thus the weight of a cubic foot of rain water being 1000 ounces, and that of a cubic foot of cast-iron being 7207 ounces, those numbers are used to denote the specific gravities of the bodies. From this definition it follows that, when the volumes of two bodies are equal, their specific gravities will be proportional to their weights: when the weights are equal, the specific gravities are inversely proportional to the volumes; and, in general, the weights of bodies vary in a ratio compounded of their volumes and specific gravities. [Specific Gravity.]

HYDROTHO'RAX (from ὕδωρ, water, and θώραξ, the chest), dropsy of the chest, is a term applied to express the existence of a collection of serous fluid in the cavity of the pleura. This collection may take place in consequence of inflammation of the pleura, which, like inflammation of other serous membranes, terminates in effusion; or it may result from the causes of general dropsy. [Dropsy; Pleurisy.]

HYDRUS (constellation), the Water-Snake, commonly called the Southern Snake, a constellation of Lacaille. It is situated between the south pole and the bright star in Eridanus (Achernar).

HYDRUS, a genus of serpents which have the posterior part of the body and the tail very much compressed and elevated vertically, so as to give them a facility of swimming adapted to their aquatic habits.

Cuvier places them with *Bongarus*, or *Bungarus*, Daudin, as constituting a tribe of serpents whose jaws are organized and armed nearly as in the non-venomous serpents; but which have the first of their maxillary teeth larger than

others, and pierced for conducting the poison, as in the venomous serpents with isolated fangs.

Daudin subdivides these water-serpents, which are said to be very common in certain parts of the Indian Sea, into the two genera *Hydrophis* and *Pelamides*. Cuvier adds the sub-genus *Chersydrus*.

HYE'RES, a town in the French department of Var, situated 11 miles E. from Toulon, on the southern slope of a hill that looks over a beautiful plain covered with plantations of the orange, citron, vine, olive, pomegranate, mulberry, and palm, and terminating in the Mediterranean, stands in 43° 7′ N. lat., 6° 7′ E. long., and has 9966 inhabitants. It is considered one of the healthiest winter residences in the south of France, being protected by hills from the north-west winds and also from the direct influence of the south-west, which sometimes blows with great violence in this part of the Mediterranean. The interior of the town is not inviting; most of the streets are steep, narrow, and ill paved; the highest part is covered with rocks and the ruins of an ancient fortress, from which run two massive walls that formerly inclosed the town. On a steep rock in this part stands a curious old church, which has been classed among the historical structures of France. Below it is an ancient château, now used as the town-house, which fronts the market-place. Lower down is the principal square, which is adorned with a column surmounted by a white marble bust of Massillon. The suburbs form the handsomest part of the town; there are several fine houses and hotels, and visitors chiefly reside here. In the suburb of St.-Laurent, on the sea-shore, there is a large establishment for the manufacture of salt. Wine, brandy, perfumes, oil, silk, orange-flowers, and fruits are the chief articles of trade. The isthmus, which joins the rocky peninsula of Giens to the mainland of the department of Var, lies between two large roadsteads, that of Hyères on the east, and that of Giens on the western side. The roadstead, or Gulf of Hyères, is protected on the south side by the three islands of Porquerolles, Port-Cros, and Levant, which are fortified, and form, with the many rocky islets near them, the group called Iles d'Hyeres. There was an ancient town on or near the site of Hyères. Several Roman remains have been found. (*Dictionnaire de la France.*)

HYGI'NUS, CAIUS JULIUS, a freedman of Augustus Cæsar, and a grammarian, was, according to some, a native of Spain, but, according to others, a native of Alexandria. He was placed by Augustus over the library on the Palatine Hill, and also gave instruction to numerous pupils.

His numerous works are quoted by the ancients; but they are all lost. The extant works which are ascribed to Hyginus are, a collection of Fables, part of a treatise, 'De Castrametatione,' 'Poeticon Astronomicon,' libri iv., and a treatise, 'De Limitibus Constituendis,' edited by Goesius in the 'Rei Agrariæ Auctores,' 1674.

HYGRO'METER (ὑγρός, moist, and μέτρον, measure) is an instrument serving to determine the quantity of aqueous vapour in the atmosphere or other gas under examination. M. De Luc employed for this purpose a thin slip of whalebone, the contractions of which indicated the variations of moisture; and De Saussure had recourse to a human hair, by means of which he constructed a far more delicate instrument. Leslie's hygrometer consists of a glass tube, bent so as to form two equal branches parallel to one another, and each terminating with a hollow ball, in which is introduced sulphuric acid coloured. One of the balls is covered with cambric, which is kept constantly moist by water from a neighbouring vessel; and the evaporation of the water, by cooling that ball, allows the air in the other, by its superior elasticity, to depress the acid in the tube below. This depression, being measured by a convenient scale, affords an indication of the relative dryness of the atmosphere.

All these instruments have however been nearly superseded by the hygrometer invented by the late Professor Daniell, of King's College, London, and described in the 8th volume of the 'Quarterly Journal of Science.' It consists of two thin glass balls one inch and a quarter in diameter, connected by a glass tube about seven inches in length. The tube is bent in two places at right angles, so as to form three arms of unequal length, the longest of which contains a small thermometer, whose bulb descends into the lower of the two glass balls. This ball, after being filled about two-thirds with æther, is placed over a spirit-lamp until the vapour of the æther has expelled the contained air through a capillary tube which is left open for the purpose, and afterwards hermetically sealed. The other ball is then covered with a piece of muslin, and the instrument thus adjusted is placed upon a stand, to which is attached a small thermometer indicating the temperature of the external air. When about to be used, a small portion of æther is poured upon the muslin, which, by evaporating, lowers the temperature of the glass ball, and thereby occasions a rapid condensation of the æthereal vapour contained within the instrument. The condensation of the vapour within the tube produces a continuous evaporation from the surface of the æther in the lower ball, whereby the temperature of the included æther is continually reduced until a deposit of moisture from the surrounding atmosphere is observed to take place upon the exterior of the glass. At this instant the inner thermometer, which always indicates the temperature of the æther, is observed, and thus the dew point, or that at which the precipitation of atmospheric moisture takes place, is determined with considerable accuracy. Having ascertained the dew point, and likewise the temperature of the external air, the actual quantity of moisture contained in the cubic foot of air will readily be found from the formula,

$$\text{Weight in grains} = \frac{5656.2}{448 + t} \times p,$$

where t denotes the temperature of the external air, and p the elasticity of aqueous vapour at the temperature indicated by the interior thermometer. The value of p for every degree of the thermometer is given in Mr. Dalton's tables of the expansive force of steam (*Manchester Memoirs*, v. 559).

HYGROMETRY is that part of natural philosophy which relates to the determinations of the humidity of bodies, particularly of the atmosphere: it comprehends also the theory of the instruments which have been invented for the purpose of ascertaining the quantity of water contained in a given volume of air.

The experiments of Dr. Dalton have proved that the water received from the earth is not dissolved in the atmosphere, and that it exists there in the form of vapour. That philosopher discovered also that the quantity of vapour contained in a portion of the atmosphere depends greatly upon the temperature of the latter, and that it is very variable even when the temperature is constant. He ascertained moreover that when a quantity of aqueous vapour at a given temperature is diffused through any space, it will support the same external pressure, whether previously that space had been void or occupied by air. On these principles are founded the methods which have been used for determining the absolute quantity of moisture in a given volume of air by means of the hygrometer, the requisite data being the elasticities of aqueous vapour at different temperatures, and the corresponding indications of the instrument.

In order to find on the scale of an hygrometer, constructed like those of De Luc and Saussure [HYGROMETER], a number of points corresponding to any given elasticities of the vapour, Gay Lussac put water into a vessel of glass; and, having determined the elasticity of the vapour arising from it, he suspended from the upper part of the vessel a delicate hygrometer. The vessel was then closely covered, so that there might be no communication between the vapour within and the external air; when, after a short time, the index of the hygrometer became stationary at a certain point on the circumference of the graduated ring which served as a scale; this point thus became an indication of the elasticity of the vapour. Experiments of the like kind being made with vapour of equal temperature, but in different states of elasticity, between those which correspond to extreme dryness and complete saturation, there were obtained so many points on the scale of the instrument as indications of the elasticities of the vapour.

The extreme points on the scale of such an hygrometer may be found in the following manner: the instrument is to be placed under a receiver in which is a certain quantity of dry caustic alkali, when, after a time, the material will contract in length as much as its nature will permit; the point on the scale at which the index stands is that of extreme dryness, and constitutes the zero point. The instrument may then be placed in water, or in a receiver filled with vapour completely saturated with moisture, when the material will expand to the greatest extent possible: the place of the index is then to be considered as the point of extreme humidity, and is usually indicated by 100.

In Great Britain the mean evaporation per minute from each square inch of the surface of water, one inch deep, is 0.01155 grains.

HYLACTES, a genus of birds established by Captain Phillip Parker King, R.N., for a form allied to *Megapodius*. Example, *Hylactes Tarnii*. Locality, the Island of Chiloe and Port Otway, in the Bay of Penas.

HYLÆOSAURUS, Dr. Mantell's name for the extinct Saurian discovered by him in the forest of Tilgate, and thence termed the Forest Lizard. The remains upon which this genus was characterized were embedded in a block of stone 4½ feet by 2½ feet, and consisted principally of bones of the trunk. The paper in which the remains of this large extinct Saurian were described was read before the Geological Society of London, in December, 1832.

Dr. Buckland is of opinion that this extinct Saurian was probably about 25 feet long, and speaks of its most peculiar character as consisting of the remains of the series of long, flat, and pointed bones, which, Dr. Buckland thinks, seem to have formed an enormous dermal fringe, like the horny spines on the back of the modern Iguana.

HYLO'BATES (from *ὑλοβάτης*, wood-walker, or one that goes through woods), Illiger's name for the long-armed Apes, or Gibbons. [APE.]

HYMENÆA, a genus of plants belonging to the natural order *Leguminosæ*. *H. courbaril*, Locust Tree, or Gum-Anime Tree, is a fine lofty spreading tree, and grows in the tropical parts of America and in Jamaica. The seeds are enveloped in a cellular mealy substance, which is sweet like honey, and is eaten by the Indians with great avidity. When fresh it is slightly purgative, but by keeping it loses this property. A decoction of this substance, when allowed to ferment, forms an intoxicating drink resembling beer. From the principal roots of this tree there exudes a fine transparent resin of a reddish colour which is collected in large lumps and sold under the name of Gum Anime or Gum Animi. It resembles amber, is very hard, and sometimes contains leaves, insects, or other objects imbedded in it which remain in a perfect state of preservation. It burns readily, emitting a very fragrant smell. Dissolved in rectified spirits of wine, it makes one of the finest kinds of varnish. In countries where this tree grows the resin is used medicinally, and has also been employed in that way in Europe. The timber of the old trees is very hard and tough, and is in great request for wheel work, particularly for cogs. The wood is very heavy, and takes a fine polish.

HYMENOMYCE'TES, the first sub-order of the *Fungi*, a natural order of plants. They are characterized by their reproductive organs, called the Hymenium, being naked. This sub-order is divided by Fries into four tribes; by Berkeley into six tribes. Those of the latter are, *Pileati*, *Clavati*, *Mitrati*, *Cupulati*, *Tremellini*, and *Sclerotiacei*.

The tribe *Pileati* contains the genus *Agaricus*, many of the species of which are eatable, and are mentioned in the article AGARICUS.

In the same genus are included the various species of *Amanita*, which are among the largest and most remarkable forms of the fungi. *Cæsarea* is remarkable for its beauty, but not

much so as for the traditional belief that it was in a dish of these mushrooms, which were regarded by the Romans as one of the greatest luxuries of the table, that Agrippina administered poison to her husband, Claudius Cæsar, in order to hasten her son's accession to the imperial power. *A. muscaria* possesses an intoxicating or narcotic property. It is used by the inhabitants of the north-eastern parts of Asia in the same manner as wine, brandy, arrack, spruce, &c., are by other nations. One large or two small fungi is a common dose to produce a pleasing intoxication, which lasts for a considerable time.

Upwards of 700 species of the genus *Agaricus* have been described; of these 333 are natives of British Islands.

In the tribe *Pileati* are also included 8 species of the genus *Cantharellus*, which inhabit Great Britain. The *C. aurantiacus* is said to be a poisonous plant. It is common in fir-woods and pastures. Is has a beautiful orange colour and a strong smell. *C. cibarius*, the common Chanterelle, is common in woods in the summer and autumn. The pileus is of a pale yellow colour, and the whole plant has an agreeable smell, like that of apricots. On the continent of Europe this fungus is eaten, but is not often used in Great Britain. It is dangerous when eaten raw, and should always be cooked. Berkeley describes five species of this genus as natives of Great Britain. Of *Schizophyllum* but one species has been found in Great Britain, the *S. commune*. The genus *Dædalea* has been so named from the remarkable sinuosities and sculpture-like pores of its hymenium. *D. quercina* is found commonly on oak-trees, or stumps and roots of that wood. It is an astringent, and has been applied to wounds to arrest hæmorrhage. There are several other species of this genus which are indigenous in Great Britain. *D. suaveolens* is a northern plant. It yields an agreeable perfume. Upwards of forty species of the genus *Polyporus* are found in Great Britain, and many more European species have been described. Many of the species are used in the arts and medicine. *P. destructor* is one of the fungi found on decaying timber when it is attacked with what is called dry-rot. The genus *Fistulina* has one representative in Great Britain, *F. hepatica*, the Pipe-Stool. It grows upon the trunks of old oaks and other trees. It is eaten in France. The genera *Sistotrema*, *Irpex*, *Radulum*, and *Phlebia*, are small. *Thelephora* is an extensive genus, and forty-two species are indigenous in Great Britain. They are common on decaying branches of trees, &c.

The tribe *Clavati*, in their branched and club-shaped forms, resemble the corals, and were actually placed by the older naturalists in the same class. Some of the species of the *Clavati* are edible. All the *Clavaria* are esteemed as food.

In the tribe *Mitrati* the genus *Morchella* yields the esculent fungus Morel. Three species are found in Great Britain. There are also three British species of *Helvella*, as that genus is at present defined. The species of *Helvella* are edible. *H. crispa* is considered the best species for eating, and none of the species are poisonous.

The tribe *Cupulati* contains 11 British genera. Some of these plants are very remarkable from the regular cup-like form and the deep colours they present. Of the genus *Peziza* the species *P. coccinea* is perhaps the most elegant plant belonging to the fungi. The outer surface of the cup which it forms is white and downy, whilst the inside is of the richest carmine. It frequently grows on sticks covered with moss, the green colour of which forms a beautiful contrast with the white and crimson of the Peziza.

The fifth and sixth tribes of the Hymenomycetes are the *Tremellini* and *Sclerotiacei*. The *Tremellini* embrace six British genera. The British genera included under *Sclerotiacei* are amongst the lowest forms of the hymenomycetous fungi, and include species which are found attacking the various cerealia, producing the disease called *Ergot*.

HYMENO'PTERA, one of the orders into which insects are divided. Hymenopterous insects possess four membranous wings, of which the anterior pair are the larger; they have all the usual parts of the mouth well developed, that is to say, they possess labrum, labium, mandibles, maxillæ, and two pairs of palpi; besides the ordinary compound eyes, they are furnished with three ocelli, or simple eyes, which are usually situated on the vertex of the head. Their tarsi are five-jointed. The females are provided with an ovipositor, consisting chiefly of three elongated slender processes, of which two serve as a sheath to the third. This ovipositor, in many species, is so organised that it can not only perform its ordinary function, but serve as a weapon of defence, and is the part which in bees and wasps is called the sting: in these insects it is barbed at the apex. The antennæ are generally filiform or setaceous. The mesothorax and metathorax are well developed; the prothorax is narrow.

Insects of the order Hymenoptera undergo what is termed complete metamorphosis, *i. e.* the larva is unlike the perfect insect, and the pupa does not possess the power of locomotion. The larvæ of some of these insects very much resemble those of the order Lepidoptera (Butterflies and Moths), but differ in the number of their legs, &c.: these feed upon plants. The larvæ however, generally speaking, are destitute of legs, and do not possess a distinct head, and these are for the most part fed by the parent insect, or, as in the case of Bees and Wasps, by the neuters. In the pupæ, all the parts of the perfect insect are visible, since they are inclosed only in a delicate semi-transparent membrane.

In the imago or perfect state most hymenopterous insects live upon flowers, or at least often frequent them, some for the purpose of gathering honey, and others find them a convenient resort wherein they may prey upon the less powerful species of their own class.

HYMENO'PTERA, FOSSORIAL. This group, to which Latreille applies the name *Fossores*, is divided into eight families:—1, *Scoliadæ*; 2, *Sapygidæ*; 3, *Pompilidæ*; 4, *Sphecidæ*; 5, *Bembicidæ*; 6, *Larridæ*; 7, *Nyssonidæ*; and 8, *Crabronidæ*.

HYMETTUS. [Attica.]

HYMN (ὕμνος), a song of praise and adoration, in honour of a Deity, and by the Hebrews, as well as the Greeks, accompanied on some musical instrument. The 'Te Deum' and 'Benedictus' are, in our liturgy, both called hymns. The hymn is a song of joy, not of lamentation. The term is now applied to any short religious poem sung in places of public worship, not being a version of a psalm, or taken directly from any of the canonical books of Scripture.

HYNDFORD, JOHN CARMICHAEL, third EARL OF, was born in 1701, and succeeded to the family honours in 1737. He represented, as one of the sixteen peers, the Scottish nobility in several parliaments, acted for two successive years (1739, 1740) as royal Commissioner to the General Assembly of the Church of Scotland, and held the dignity of lord lieutenant of the county of Lanark. He was sent in 1741 as envoy extraordinary and plenipotentiary to Prussia; in 1744 he was sent as ambassador to Russia; and in 1752 he was sent on an embassy to Austria. In 1764 he was appointed lord vice-admiral of Scotland. He died in 1767, leaving no issue. His official correspondence, extending to twenty-three volumes in manuscript, is now in the British Museum.

HYOSCY'AMUS, a genus of plants belonging to the natural order *Solanaceæ*. One of the species of this genus, *Hyoscyamus niger* (Henbane), is an indigenous herbaceous annual or biennial plant, of which the leaves and seeds are officinal. The leaves should be collected when the plant is flowering, dried quickly, and preserved in well-closed vessels, in a cool dry place. The virtue of the leaves is dependent on the presence of *Hyoscyamia*, which however is more easily obtained from the seeds. When bruised they evolve an odour of henbane. Taste oily, bitter; by expression they yield a fat oil, and also furnish a very powerful extract, as well as hyoscyamia. This alkaloid crystallizes in stellated acicular crystals, with a silky lustre; but it more generally occurs in a colourless transparent soft viscid mass. When properly dried it is devoid of odour, but when moist, and particularly in an impure and coloured condition, the odour is highly disagreeable, stupifying, and tobacco-like. Its action, even in a very small quantity, is extremely narcotic and fatal, like nicotine. It kills more slowly than conia, and scarcely causes convulsions. Applied externally to the eye, even in a very minute quantity, it causes great and enduring dilatation of the pupil.

Hyoscyamus, when taken by a person in health, produces disorder of the nervous system, inducing symptoms greatly resembling hysteria, if the dose be moderate; but if large, it causes all the phenomena of narcotic poisoning. Administered in medicinal doses to persons with disturbance of the nervous system, it lessens the irritability, quiets the circulation, and, when morbid wakefulness exists, disposes to sleep. It possesses a superiority over opium in many instances, as it does not constipate the bowels, but rather acts as a mild laxative.

In case of accidental poisoning, the stomach-pump should be used, or an emetic of sulphate of zinc be given. If the brain should appear much oppressed, venesection may also be resorted to.

HYPERBOLA. In connection with this article see ELLIPSE and PARABOLA. The hyperbola is one of the curves known by the name of Conic Sections. It is in the application of mathematics the least useful of the three; indeed so very rarely does the necessity of using it occur that it may be a question whether the study of it should form a part of a course of practical mathematics. But there are, in pure analysis, so many analogies which are illustrated by distinctions existing between the properties of the ellipse and hyperbola, that the student who aspires to more than elementary knowledge cannot dispense with the comparison of the two curves.

HYPE'RBOLE (ὑπερβολή) means literally an over-casting; in its common sense, a going beyond the truth in describing an object, not by the introduction of qualities which do not belong to it, but by the exaggeration of those which do. For example, it may be hyperbolical to say that the complexion of a fair woman is whiter than snow; but to say so of a brown woman is either irony or simple falsehood.

HYPERICA'CEÆ, a natural order of polypetalous exogenous plants. The species inhabit various parts of the world, both within and without the tropics; they are especially common in the southern states of the North American Union. Many are objects of ornament, but they are little cultivated, because they have frequently a disagreeable hircine odour. They are generally astringent, and in some cases, as in the genus *Vismia*, yield a substance so much resembling gamboge as to have acquired in commerce the name of American Gamboge.

HYPE'RICUM, a genus of plants belonging to the natural order *Hypericineæ*. St. John's Wort is the common name of all the species. *H. maculatum* is the *H. quadrangulum* of Fries, and is found in moist places by ditches and rivers. *H. perforatum* is found in large quantities in Britain and throughout Europe; also in the north of Asia and Africa. The flowers are of a bright yellow colour, dotted and streaked with purple. When rubbed they emit a powerful lemon-like scent, and stain the fingers with dark purple. *H. laxiusculum* is a native of Brazil, in the provinces of St. Paul and Minas Geraes, where a decoction of the leaves is used as a remedy against the bites of serpents. *H. crispum* is a native in the regions of the Mediterranean. At the present day it grows near the sea in Attica. Most of the species of Hypericum are showy, and deserve cultivation.

HYPERI'DES or HYPE'RIDES, an Athenian orator, a contemporary of Demosthenes. He was engaged in the Lamian war, which followed the death of Alexander, B.C. 323, and he spoke the funeral oration over those who fell in the battle. A fragment of this oration is preserved by Stobæus ('Serm.' 123). In B.C. 322, Hyperides with Demosthenes and others, having fled from Athens, was condemned to death, and the sentence was carried into effect by Antipater. There is no extant oration of Hyperides.

HYPERSTHENE (Labrador Hornblende)

curs crystalline and massive. Primary form a rhombic prism; colour varying from reddish to greenish-black, with a greenish gray streak; opaque; specific gravity 3·389. It consists mainly of silica, oxide of iron, and magnesia.

HYPERSTHENE ROCK is a sort of trap, of which there are three varieties, viz. Hyperstheneite with compact felspar; Hypersthene with common felspar; Hypersthene with glassy felspar. In largeness of grain it varies from large-grained granite to ordinary greenstone, or is even as fine as basalt. The felspar is of various colours.

HYPERTROPHY (from ὑπέρ, above, and τροφή, nutrition), a term in medicine signifying the enlargement of a part of the body from excessive nutrition. The hypertrophied organ contains no new solid or fluid substance, but one or more of its proper component tissues is in greater quantity than in the healthy state. The opposite condition of a part, namely, diminished bulk from defective nutrition, is termed ATROPHY.

When hypertrophy attains such a degree as to interfere with the action of the organ in which it is seated, it constitutes an important and highly dangerous disease. Such is frequently hypertrophy of the heart.

The treatment consists in the removal of the exciting cause, if this can be effected. The part should be kept at rest as much as possible, all irritation prevented, and the supply of blood diminished.

HYPOCHARIS, a genus of plants belonging to the natural order *Compositæ*. There are two British species of this genus, *H. glabra*, and *H. radicata*. They are found on waste places which are dry and gravelly.

HYPOCHONDRI'ASIS is a state of extreme sensibility of the nervous system, which leads patients to believe themselves worse than they really are, to detail their sufferings with exaggeration, to individualize all the painful sensations which they experience, and to consider them the symptoms of so many different diseases. Allied to this extreme sensibility there is a mental exaltation, which causes the patient to pay the most minute attention to what passes within himself. He recounts all the details of his animal and organic life; relates the manner in which his digestion is effected; and describes his sensations, his passions, and the succession of his ideas.

The sufferings of hypochondriacs have been called imaginary, but it is not correct to call them so, if it is meant that they are not really felt. Of all patients, those whose diseases are the result of an excited imagination probably suffer the most. In many cases however these persons are affected with a real disease, and the term hypochondriasis is applicable to them only in consequence of their having their attention constantly fixed on their complaint, and of their experiencing a degree of fear and sadness which their condition does not warrant.

Hypochondriasis is frequently witnessed in young men of studious habits, and is the result of intellectual application too much prolonged. Another very fertile source of hypochondriasis is luxury, and the want of occupation and exercise. Hypochondriasis occasionally results from other causes, such as misfortunes, the excesses to which young men are sometimes addicted, and the prolonged and injudicious use of medicines.

The treatment of hypochondriasis must of course vary in some degree with its cause; but in all cases a remedy must be sought for in the banishment of their groundless fears, in a change in their mode of life, and in scenes that withdraw them from the continual contemplation of themselves.

HYPOGENE, a term in geology implying 'nether-formed,' proposed by Lyell as a substitute for the word *primary*, but not yet generally admitted by geologists.

HYPONITROUS ACID. This liquid at common temperatures is green, but at 0° it is colourless; it is very volatile, so that when exposed to the air it is rapidly converted into an orange vapour, the density of which is stated to be 1.72, air being 1. It consists of $O^1 N^1$. Hyponitrites may be formed by moderately heating certain nitrates, the acid of which losing two equivalents of oxygen, hyponitrous acid remains, and in combination with the base.

HYPOTHEC (from the Greek ὑποθήκη, a security, literally the subjection of a thing to the power of another person) is a term derived from the Roman law, still in use in the law of Scotland, and in that of France under the name of hypothèque. In the law of England it is not a received technical expression, but it is occasionally used in the same sense in which it is used in the Roman law. Hypotheca, in its proper acceptation, is that security which a man has for an obligation, when the thing which is his security is not placed in the creditor's possession, in contradistinction to pignus, which applied to what is now termed a pledge.

HYPOTHENUSE, or HYPOTENUSE (ὑποτείνουσα, subtending), is a term which has always been applied since the time of Euclid to the side of a right-angled triangle which subtends, or is opposite to, the right angle.

The property of the hypothenuse of a right-angled triangle is one of the most important elementary propositions in the whole of mathematics. The property in question, in a limited form, is this: that the square on the hypothenuse is equal to the sum of the squares on the sides. The introduction of the square however, in preference to any other figure, arises from the fact of the property of the hypothenuse with respect to the square being demonstrated before that with respect to any other figure. The general proposition is this: If three similar figures (that is, figures of the same shape, but differing only in size) be described upon the three sides of a right-angled triangle, the content of that which is described upon the hypothenuse will be equal to the sum of the contents of the figures described upon the sides.

HYPOTHESIS (ὑπο θεσις, *sub-positio*, supposition), literally, the act of placing one thing under another, that the latter may stand upon and be supported by the former; metaphorically, the assignment of any cause or reason why an observed event or phenomenon should have

happened. For instance, the sun would disappear if it were deprived of its power of giving light, and also if an opaque body came between us and it: either of these circumstances would cause what we term a total eclipse, and either is therefore sufficient, as an hypothesis, to explain a total eclipse.

HYRAX, the generic name for a form of quadrupeds of small size, but of great interest, in consequence of the peculiarity of their organization, which has led the more modern zoologists to assign them a place among the Pachydermata, though their external appearance, when cursorily examined, would seem to point out their relationship to the Rodentia, among which they have been erroneously classed.

Incisors, $\frac{2}{4}$; canines, 0; molars $\frac{7-7}{7-7} = 34$.

Cuvier observes that there is no quadruped which proves more completely than the Hyrax the necessity of having recourse to anatomy for the determination of the true relations of animals. To that great zoologist we are indebted for the fact that the quadruped under consideration is a true Pachyderm, and, notwithstanding the smallness of its proportions, must be regarded as intermediate between the Rhinoceros and the Tapir. The resemblances which the Hyrax bears to the former of these may be traced, according to Cuvier, as far as the osseous structure is concerned, in the general form of the trunk, in the first place. The Hyrax has 21 ribs on each side, a number superior to that possessed by any other quadruped, the Unau excepted, which has 23; and those which, after Hyrax, have the most, belong precisely to the order of Pachydermata, in which Cuvier would arrange it. Thus, the Elephant and the Tapir have each 20; the Rhinoceros has 19; the Solipeda have 18. The greater part of the Rodentia, on the contrary, have only 12 or 13; and the Beaver, which has the most, has only 15.

The upper incisors of Hyrax are not formed, like those of the Rodentia, in the shape of a quadrangular prism, or in that of a cylinder curved and terminated by a truncation or a corner-edge. They are triangular, and terminate in a point, recalling to the observer the canines of the Hippopotamus. The lower incisors are laid forward, like those of the Hog; they are flat and dentilated in youth, but soon become worn by attrition against the upper incisors. The molars represent those of the Rhinoceros, both in number and form, so that, were it not for the size, they might be mistaken for each other.

The fore feet are divided each into four toes tipped with hoof-like nails; the hind feet into three, of which the innermost is furnished with a long claw-like nail. The toes are all buried in the skin as far as the little hoofs, precisely as in the rhinoceros.

Several species belong to the present genus; of these we may notice the Syrian Hyrax (*Hyrax Syriacus*), the Daman or Coney of Scripture; the Cape Hyrax (*Hyrax Capensis*); and the Tree Hyrax (*Hyrax arboreus*), which inhabits the hollows of decayed trees in the forests of South Africa.

With respect to the Syrian Hyrax, Bruce states that, 'in place of holes, the animal seems to delight in less close or more airy places, in the mouths of caves or clefts in the rock, or where one projecting, and being open before, affords a long retreat under it, without fear that this can ever be removed by the strength or operations of man.' He describes it as gregarious, and says that frequently several dozens of them sit upon the great stones at the mouth of caves warming themselves in the sun, and coming out to enjoy the freshness of a summer evening. 'They do not,' he continues, 'stand upright upon their feet, but seem to steal along as in fear, their belly being nearly close to the ground, advancing a few steps at a time and then pausing. They have something very mild, feeble-like, and timid in their deportment; are gentle, and easily tamed, though, when roughly handled at first, they bite very severely.' The same author says that these quadrupeds are found plentifully on Mount Libanus, and that he has also seen them among the rocks at the Pharan Promontorium, or Cape Mahomet, which divides the Elanitic from the Heroopolitic Gulf, or Gulf of Suez. They seemed to him to be the same in all places; but, if there was any difference, those of the Mountain of the Sun were superior in size and fatness. He kept one some time, and gives an interesting account of its habits in confinement.

Hyrax (*Hyrax Capensis*).

For an interesting account of the habits and manners of the Cape Hyrax, both in its natural condition and also in captivity, see 'Proceedings of the Zoological Society,' 1835, p. 13; and for anatomical details, 'Proceedings of the Zoological Society,' 1832, p. 202, and 1835, p. 14.

HYRCA'NIA, a province of the ancient Persian empire, lay at the S.E. corner of the Capsian Sea. Hyrcania was a plain sloping from the mountains towards the Caspian Sea, and was very fertile, producing grapes, figs, and corn in abundance, though the land was not much cultivated. Previous to the Persian conquest Hyrcania appears to have been subject to the Chorasmii. After the dissolution of the Persian empire it became subject to the Macedonians. It appears afterwards to have become independent. Strabo informs us that there were several towns in Hyrcania, of which the most important were Tambroce, Samariane, Carta, and Zadracarta, which Arrian mentions as the capital ('Anabasis,' iii. 2

HYRCA'NUS, JOHN, one of the Asmonæan rulers of Judæa, succeeded his father Simon in the high priesthood, B.C. 135. During the first year of his reign (B.C. 134) Jerusalem was besieged by Antiochus Sidetes, and after a long siege Hyrcanus was obliged to submit; but he eventually established his independence. The latter part of his reign was troubled by disputes between the Pharisees and Sadducees. Hyrcanus originally belonged to the Pharisees, but quitted their party, and became in consequence very unpopular with the common people. He died B.C. 106, and was succeeded by his son Aristobulus, who was the first of the Asmonæan princes who assumed the royal title.

HYRCANUS II. [ASMONÆANS.]

HYSTASPES. [DARIUS I.]

HYSTE'RIA (from ὑστέρα, the womb) is, in general language, understood to signify those paroxysms to which females are subject, and which are attended with convulsions, a sense of choking, and involuntary laughing or crying. But the term is used in medicine as a general expression to include a vast number of other symptoms known as 'nervous disorders,' all dependent on a peculiarly susceptible state of the nervous system, and not confined to women, nor dependent on diseased states of the womb.

What is called the hysteric fit generally commences with the sensation of a ball in some part of the abdomen or in the left side, which rises with a twisting vermicular feeling to the throat, where it induces a sense of suffocation. A temporary state of loss of sense and voluntary power succeeds, in which the patient either lies motionless, or is agitated with violent struggles of the limbs. In the absence of convulsions there is often immoderate laughter, crying, or singing, and the paroxysm is frequently terminated suddenly by a burst of tears. More usually the patient lies quietly for some time after the convulsions cease, and when recovered complains of headache.

During a fit of hysteria, care should be taken to prevent the patient receiving injury from the head or hands striking against the floor or hard bodies, and to guard against the propensity to bite, by placing a folded cloth between the teeth. If the fit be slight, it may frequently be arrested by dashing cold water over the face, or by filling the mouth with something which has an unpleasant taste, as salt; or a stimulating scent may be held to the nostrils. If the paroxysm be more prolonged and violent, it will be proper, should the face be flushed and head hot, to apply wet cloths to the forehead, and to loosen all the dress about the neck and chest. When there is less fulness about the head, small doses of stimulants, such as sal volatile in water, will be useful.

The general nervous symptoms will frequently resist every mode of treatment. Giving tone to the system and relieving the mind are frequently the most important objects to be had in view. Prevention in these cases is better than cure; but prevention cannot certainly be hoped for until the education of females is directed more towards strengthening their body and improving the tone of their mind, so as to enable them to control, and not merely conceal, their passions.

HYSTRIX. [PORCUPINE.]

HYTHE. [CINQUE PORTS; KENT.]

I is a vowel which represents two very different sounds in different languages. In England it denotes a rapid pronunciation of the diphthong *ai*. In French, Italian, and many other tongues, its sound is that of the English *e*. In the series of the vowels established by the experiments of Mr. Willis, *i*, as denoting the latter sound, lies at one of the two extremes. It is pronounced with the lips retracted so as to shorten the vocal tube, whereas the same organs are protruded to produce the sound represented at the other extremity by *u*. As to the various forms of this letter see the Plates of the ALPHABET.

The letter is interchangeable as follows :—

1. With the diphthongs *ai, oi, ei*, as in the Latin language, where *alais, requairo, pueroi, puerois, nulloius, deico*, &c., were corrupted into *alīs, requīro, puerī, puerīs, nullīus, dīco*. In the same language, when one *i* was followed by another *i*, it was not uncommon to denote them by a single long *i*, as *tibīcen, Chīus, alīus* (gen.), for *tibiicen, Chiius, aliius*. In such cases it was common to give greater length to the letter, thus, CHIVS.

2. The short *i* was interchangeable with nearly all the short vowels, more particularly in the penult syllables of polysyllabic words, which are very indistinctly pronounced. Thus the Greek *mēchănē* is in Latin *māchĭna*. In the same manner the Nomad races of North Africa are called by the Greeks *Nomades*, by the Romans *Numidae*. *Bonitas* must have been originally *bonotas*, and would have been written in Greek with a termination -οτης. Lastly, in a large number of words a short *u* degenerated into an *i* : as *maxsŭmus, decŭmus, recŭpero, scribŭmus* (compare *sŭmus*), into *maximus, decimus, recipero, scribimus*.

3. A short *i* before *n* or *m* is not unfrequently in French changed into *ai* or *a*. *Vincere* is in French *vaincre*, &c. [A.]

4. In the same language the vowel *i* is changed into *oi* very commonly, as *sitis, soif ; mi, moi ; fides, foi ; Ligeris, Loire*, &c., and this though the *i* in Latin be short.

5. *I* is often inserted in French or Spanish words before the vowel *e*. [E.]

6. The vowel *i* is often inserted after the vowels *a, o*, and *u*, in the French language, particularly when a contraction has taken place, as *aimer, connoître, réduire*, from *amare, cognoscere, reducere*. [A.]

7. When the vowel *i* in the Latin language has a vowel after it, and is preceded by one of the consonants *p, b ; t, d ; c, g ;* the derived languages have often a sibilant in the place of the former consonant. Thus *sapiam* is in French *sache ; rabies, rage ; ratio, raison ; medius*, in Italian, *mezzo* (compare the Greek μεσος). The double sound of *c* and *g* in our own language may have originated in this way.

A similar change occurs in other cases, as *simia*, French *singe ; vindemia, vendange ; lineus, linge*.

IAMBICS, a species of verse composed of a succession of iambi (⏑ –), or equivalent feet, was used both by Greek and Latin poets. The iambic is the most common metre in the Greek tragic poets.

The following feet may be admitted in the iambic metre in the Greek tragic poets, which is usually called the tragic trimeter acatalectic, because it consists of three entire metres, or six feet.

1.	2.	3.	4.	5.	6.
⏑ –	⏑ –	⏑ –	⏑ –	⏑ –	⏑ –
⏑ ⏑ ⏑	⏑ ⏑ ⏑	⏑ ⏑ ⏑	⏑ ⏑ ⏑	⏑ ⏑	
– –		– –		– –	
– ⏑ ⏑		– ⏑ ⏑			
⏑ ⏑ –					

The anapæst in proper names is admissible in every place except the last, with this restriction, that the anapæst must be contained in one word. The comic trimeter admits the same feet as the tragic, and also a dactyl in the fifth place, and an anapæst in common words in every place but the last. Much of the beauty of the iambic trimeter depends upon the cæsura [CÆSURA], which usually occurs in the middle of the third or the middle of the fourth foot.

For an account of the other iambic metres employed by the Greek and Latin poets, see Hermann, 'Elementa Doctrinæ Metricæ.' In English poetry the iambic metre is very common, as, for example :—

> 'On Lin'den, whe'n the su'n was lo'w,
> All bloo'dless la'y th' untro'dden sno'w,
> And dar'k as win'ter wa's the flo'w,' &c.

IA'MBLICHUS, a neo-Platonist of the fourth century A.D., was born at Chalcis in Cœlosyria. His reputation among his contemporaries cast into the shade the fame of his teacher Porphyry, who he was far from equalling either in learning or in powers of mind. The literary career of Iamblichus extends from the reign of Constantine the Great to that of Julian the Apostate, whose favour he obtained, not only on account of his general adherence to and defence of the old national religion, but particularly for his 'Life of Pythagoras.' In this work Iamblichus ascribed to the Italian philosopher miraculous powers and acts, which might rival the signs and wonders on which the Christians not only founded the divine authority of their creed, but still laid claim to. Iamblichus made the perfection of man's moral nature to consist in a state of contemplative innocence. He also asserted the existence of several classes

spiritual essences, or dæmons, and attempted to determine the mode and occasions of their manifestation and operations, and the means by which man may subject them to himself, and employ their agency in the execution of his own designs. Several legends are extant in which Iamblichus is described as compelling the spirits to obedience.

IAXT. [JAXT.]

IBE'RIA was the name given by the Greek writers to Spain. The Ibéri are said to have occupied also Southern Gaul as far east as the Rhone. (Strabo, Casaub., 160.) They were a distinct race from the Celtæ, who at a remote period crossed the Pyrenees, and occupied the central parts of the Peninsula, and from whose admixture with the Iberi the Celtiberi sprang. [CELTIBERI.] Wm. Humboldt asserts that the Basque language is the remains of the old language of the Iberian race which at one time spread over Spain, Southern Gaul, part of Italy, and the islands of Corsica, Sicily, and Sardinia, and he attempts to prove this by the affinity between the proper names in those countries. Strabo observes that the Romans used the names Iberia and Hispania indifferently to denote the whole peninsula.

Iberia was also the name given by the Greeks and Romans to a country south of the Caucasus, having Albania to the east, Colchis to the west, and Armenia to the south, and corresponding to the central or principal part of modern Georgia.

IBE'RIS is a genus of cruciferous or brassicaceous plants, consisting of annual, perennial, and slightly shrubby species, chiefly inhabiting Europe, and particularly the northern shores of the Mediterranean Sea. Two are found in the north of Europe, one of which, *I. amara*, is British. The plants have a very beautiful appearance, and are cultivated in gardens as objects of ornament, under the name of Candytuft, in allusion to their having been first procured from Candia.

IBEX. [GOAT.]

IBIS. [ABOU-HANNES; TANTALIDÆ.]

ICE. [FREEZING.]

ICE-HOUSE, a building constructed for the purpose of keeping ice through the summer, by excluding, as perfectly as possible, the influence of changes in the temperature or humidity of the external atmosphere. Such structures are not only useful for preserving ice which is to be applied to the cooling of liquors, or to the preparation of articles of confectionary, but also as affording the most effectual means known for keeping meat, fish, game, vegetables, and fruit, sweet and fresh in hot weather.

One of the simplest modes of preserving ice consists in enveloping the ice in a great quantity of straw, above the surface of the ground, in such a position that moisture, which is even more injurious than heat, may drain off freely.

An underground ice-house may be simply a large cellar, with hollow or double walls, floor, roof, and doors, and furnished with a trapped drain to allow the escape of such water as may be produced by a partial thaw, without admitting any air. Mr. Loudon ('Encyclopædia of Cottage &c. Architecture') gives a ground-plan and section of a complete ice-house of approved construction, of the inverted conical shape, with an arched roof, which it is proposed to cover with two or three feet of earth, or more in hot climates, over which he suggests the propriety of training ivy, for the sake of excluding solar heat. In this design a small pump is shown communicating with a well in the drain of the ice-house, for the purpose of raising the thaw-water for drinking or other use. Dr. Ure, in his 'Dictionary of Arts,' &c., art. 'Ice-house,' gives a section of a similar structure, but with solid walls and a conical roof of timber, which may be simply thatched, or covered with brickwork and thatched, and which should have a gutter round it to collect and conduct to a distance all rain that falls upon it, that the circumjacent ground may be kept dry. Many other forms of ice-house have been proposed by different writers. The importation of American ice from Wenham Lake has somewhat lessened the necessity for collecting ice in England.

ICE-PLANT. [MESEMBRYACEÆ.]

ICELAND, a large island in the North Atlantic, extends from 63° 24′ to 66° 30′ N. lat., and from 13° 15′ to 24° 40′ W. long. Its area is vaguely reckoned at 40,000 square miles. The coasts are deeply indented with fiords, which are the æstuaries of the rivers which flow from the interior. The island is crossed from east to west by rugged mountains, which run nearer to the south than to the north coast, the longer rivers flowing towards the north. From these ridges numerous offsets branch out, and terminate in high and steep promontories. Between these offsets in the vicinity of the fiords are fine valleys, in which the inhabitants have erected their dwellings; and many of the low mountains are covered with a coarse grass, which affords summer pasture to their cattle. The best inhabited spots are on or near the banks of the fiords, where factories are built for the purpose of trade and shipping. But the majority of the inhabitants live in detached cottages or farms, a certain number of which constitute a parish, having a church and an incumbent of the episcopal Lutheran communion. The interior of the island is a dreary desert. It consists partly of snow mountains, called Yökuls, many of which are also volcanoes, and partly of vast tracts covered with lava, scoriæ, and volcanic sand. There are also several lakes, the largest of which, called Myvatn, is about 40 miles in circumference. The most extensive mass of icy mountains is that called Klofa Jökul, in the south-east part of the island.

There are numerous boiling springs, such as the Geysers, which throw up, at periodical intervals, columns of boiling water to the height of 200 feet; the Reykium and the sulphur springs of Krisuvik are near the south-west coast; those of Reykiadal in the west district; and those of Reykiahwerf and Krabla in the north. There are also bogs of boiling mud, craters of volcanoes now quiescent, and columns of dense smoke and steam issuing from many spots. The whole island appears to be of volcanic formation, and there are still numerous volcanoes in full activity; among which are Hecla (5210 feet high), Katlegia, and Skeidara.

The trees of Iceland are all of short stunted growth. Corn is cultivated to a limited extent. Hay is the great harvest of Iceland. Those who live on the coast attend to fishing, which is very productive; and those a little further inland rear cattle. The common food of the people is butter, milk, and fish; fresh meat and rye bread are holiday fare. The exports consist of cod and other dried fish, whale oil, salted mutton, eider-down, and sulphur, which is abundant. Turf is the common fuel of the inhabitants; fossil wood, iron, and copper are found.

The inhabitants, who amount to between 50,000 and 60,000, are the genuine descendants of the old Scandinavians or Norsemen; they are tall, but not generally corpulent, with a florid complexion, flaxen hair, and an open frank countenance. The women are shorter and more inclined to corpulence than the men.

The Icelandic language is the standard of the northern or Scandinavian dialect of the Gothic language. Since the language has been no longer spoken in Scandinavia (Norway, Sweden, Denmark), it has been styled exclusively Icelandic. The first colonists of Iceland were Norwegians, who fled in the ninth century from the dominion of Harold Harfager, tyrant of Norway. They established a republican government, appointed magistrates, and had their annual Althing, or national assembly, which was held at Thingvalla, in the south part of the island. Icelandic literature began to be cultivated immediately after the introduction of writing, in 1057. Iceland fell under the yoke of Norway in 1264; and it has ever since followed the fortunes of that country.

Within the last eighty years literature has been much cultivated by the Icelanders; and the language and literature of Iceland have begun to attract attention among the scholars of Denmark, Germany, and England. Elementary education, and even a certain degree of superior information, is very generally spread among the Icelanders.

Iceland is divided for administrative purposes into four large fiordnungs, or districts, north, east, south, and west. Of these the southern and western are the most inhabited. These districts are divided into syssels, or sheriffdoms, under a governor-general appointed by the king of Denmark.

Reikjavik, the chief town, contains about 600 resident inhabitants, and is built on the south side of an inlet of the Faxefiord, on the south-west coast of the island. It consists of two streets, and contains the chief buildings of the island. The houses, with a few exceptions, are constructed of wood, after the Norwegian fashion, with a store-house and a small garden attached to them. To the south-west of Reikjavik is the peninsula of Alftaness, adorned with a church and a number of pretty cottages. Gardé, in the same neighbourhood, is the residence of the archdeacon of Iceland, and at Hafnarfiord there is a dry dock.

In the northern district there is a kind of town or village, called Eyafiordur, and a factory, called Husavik, on the Skialfiandafiord, from which sulphur from the neighbouring mines is shipped. Other factories are scattered about the coast, especially in the west.

(Henderson's *Journal;* Sir George Mackenzie's *Travels.*)

ICELAND-MOSS. [CETRARIA.]

ICELAND SPAR. [CALCAREOUS SPAR.]

ICHNEUMON, the name applied by Lacépède, Geoffroy, and others, to a genus of digitigrade carnivorous quadrupeds, allied to the Gennets (*Genetta*, Cuv.) and Paradoxures (*Paradoxarus*, F. Cuv.) It is the *Mangusta* of Oliver and others, *Herpestes* of Illiger, *Mangouste* of the French.

Feet short, with five demipalmated toes armed with slightly retractile claws; tongue furnished with horny papillæ; ears small; anal pouch voluminous, simple; body elongated; tail long, strong at the base; hairs of the fur annulated. Teeth, 40, consisting of—

Incisors, $\frac{6-6}{6-6}$; Canines, $\frac{1-1}{1-1}$; Molars, $\frac{6-6}{6-6}$.

Locality, India and Africa.

Examples, *Herpestes Pharaonis; H. griseus; H. badius; H. vitticollis; H. fasciatus; H. gambianus*, &c.

The Egyptian Ichneumon (*H. Pharaonis*) was celebrated by the ancients for its destructiveness among snakes and other reptiles; and many exaggerated accounts relative to its darting into the crocodile's mouth and tearing the monster's entrails were received as truth. It was one of the sacred animals of the Egyptians, and was occasionally kept tame. It is a bold and familiar animal, preying upon snakes, crocodile's eggs, rats and mice, poultry and other birds, much resembling, in fact, a polecat in its manners. In size it exceeds a common cat. The general colour is freckled gray; the long tail is terminated by a black tuft. Locality, Northern Africa.

Ichneumon Pharaonis.

ICHNEUMON, a genus of insects belonging to the order *Hymenoptera*, section *Terebrantia*, and family *Pupivora*, in the arrangement of Latreille. The genus, as defined by Linnæus, included such pupivorous hymenoptera as are furnished with veined wings (the anterior pair presenting in the disk several complete or closed cells), filiform or setaceous vibratile antennæ composed of a great number of articulations, and an ovipositor of various lengths and complicated structure. The Linnæ

genus now constitutes a group including a great many well-marked genera, and an immense assemblage of species. All these are remarkable for the habits of their larvæ, which are parasitic in the bodies of other insects. These bodies the perfect Ichneumons perforate by means of their ovipositors, and there lay their eggs. This destructive habit gave rise to the name by which they are known; a comparison being drawn between them and the Egyptian ichneumon, the quadruped celebrated as the destroyer of serpents and crocodiles.

ICHNOCA'RPUS, a genus of plants belonging to the natural order *Apocynaceæ*. *I. frutescens* is a native of Ceylon and Nepaul. The flowers are small and purple; the leaves deep green above and pale beneath. *I. Afzelii* is a native of Sierra Leone, and about the river Bascha, in woods and among bushes.

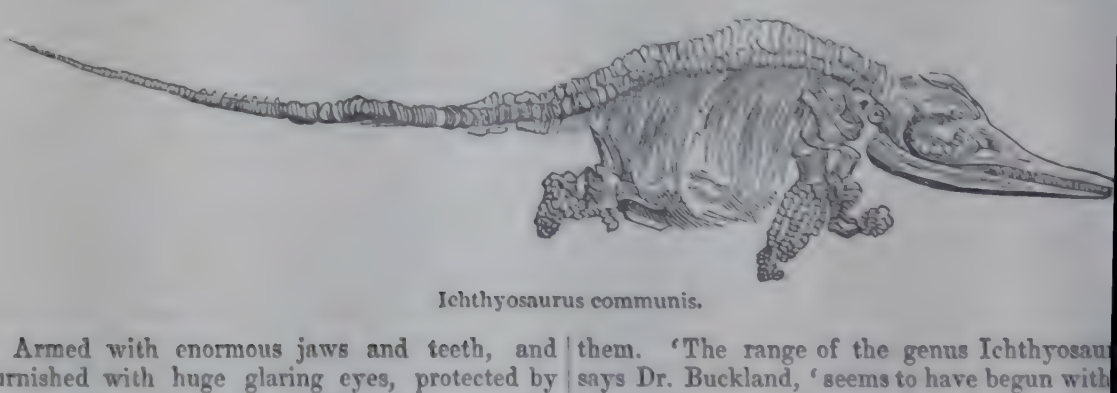
ICHTHYO'LOGY (from ἰχθύς, a fish, and λόγος, a discourse), a department of zoology embracing the structure and natural history of fishes. [FISH; FISHES, FOSSIL.] To the views and labours of Agassiz allusion has already been made under the foregoing articles. The geographical distribution of fishes has recently attracted much attention; and several valuable local monographs have been published within the last few years, which on this point have added greatly to our knowledge. We allude to such monographs as Bennett's 'Fishes of Ceylon,' with exquisitely coloured plates, and Yarrell's 'British Fishes,' with admirable woodcuts. Nor are other labourers wanting. In the north of Europe, besides the writings of Nilson and Eckstrom, the fishes of Denmark have been illustrated by Henrik Kroyer. Those of Belgium have been carefully examined by M. de Selys Longchamps. In that naturalist's 'Faune Belge' fifty-three fresh-water fishes and forty-one species inhabiting the sea are enumerated. Of the former, forty-three live only in fresh water; six in fresh water, but go to the mouths of rivers in winter; and four live in the sea, but migrate to the rivers in spring or summer. Of the sea-fishes thirty pass up the Schelde as far as Antwerp. The fresh-water fishes of central Europe have engaged the attention of Agassiz. Freyer has published an account of those inhabiting Carniola, amounting to thirty-two species. Italian ichthyology has been admirably illustrated by Charles Bonaparte, the Prince of Musignano. In Asia the fishes of the Caspian have been described by Eichwald in his 'Fauna Caspio-Caucasica,' published in 1841. Those inhabiting the rivers of Syria have been enumerated by Heckel (1843) from the collections of Kotschy. Fifty-seven species inhabit the rivers Orontes and Euphrates, of which no fewer than forty-five are *Cyprinidæ*. Indian ichthyology has received valuable contributions from M'Clelland, whose papers have been chiefly published in the Calcutta Journal. In Siebold's 'Fauna Japonica' (1842) are accounts and figures of Japanese fishes by Temminck and Schlegel. The most valuable contribution ever made to our knowledge of the ichthyology of Eastern Asia was communicated to the British Association at Cambridge in 1845, in the form of a report on the 'Ichthyology of China,' by Dr. Richardson. From his researches it would appear that the fishes of that region are not only very numerous as regards species, but also very valuable on account of the extensive fisheries there carried on. His remarks on their distribution are highly interesting. It would appear that chains of islands or coasts having an east and west extension determine the extent of the range of species and groups of species. For example, to take the intertropical zone of the ocean, we find a great number of fishes common to the Red Sea, the coasts of Madagascar, the Mauritius, the Indian Ocean, the south of China, the Philippines, the Malay Archipelago, the northern coast of Australia, and the whole extent of Polynesia, including the Sandwich Islands. As regards the generic forms of the fresh-water fishes, China agrees with the peninsula of India. Were the vast zone in question, embracing more than two-thirds of the circumference of the globe, to be suddenly elevated, we should find the remains of fishes similar everywhere throughout, the species which have a local distribution being few and unimportant. This result of Dr. Richardson's researches is of the highest importance when brought to bear on geological considerations. Dr. Richardson has also been engaged in the special investigation of the ichthyology of Australia, and his many valuable memoirs on that subject may be consulted in the 'Transactions of the Zoological Society,' and in the 'Annals of Natural History.' In Dieffenbach's 'Travels in New Zealand' (1843), the same indefatigable and philosophic zoologist has published, in conjunction with Mr. Gray, a list of the fishes of New Zealand. Ninety-two species are there numerated. In Smith's 'Illustrations of the Zoology of South Africa,' figures and descriptions are given of the fishes of the Cape of Good Hope. The researches of Dr. Peters on the eastern coast of Africa, at present in progress, promise to make us well acquainted with the ichthyology of that interesting region. With those of the northern part of Western Africa we have had information in the valuable memoirs of Lowe on the fishes of Madeira ('Zoological Transactions and Proceedings'). The labours of Jenyns on the fishes collected during Captain Fitzroy's voyages have contributed materially to our knowledge of the ichthyology of the southern extremity of South America, whilst that of Guyana has been illustrated by Sir Robert Schomburgk, in the 'Naturalist's Library.' De Kay's 'Zoology of New York' (1842) has made us acquainted in detail with the fishes of the United States. They amount, so far as known, to 440 species, distributed through 156 genera and 32 families. In the state of New York there are 126 *Acanthopterygii*, 115 *Malacopterygii*, 3 *Lophobranchii*, 18 *Plectognathi*, 3 species of sturgeon, and 27 cartilaginous fishes. It is to be regretted that the researches of Dr. Parnell on the West Indian fishes are still unpublished, since they would go a long way towards enabling us to gain a connected view of the ichthyology of the new world.

ICHTHYOSAU'RUS, literally *Fish-Lizard* (Ἰχθύς, Σαῦρος), the generic name given by Mr. König to the extinct fossil animal noticed by the late Sir Everard Home, under the appellation of

Proteosaurus, and by Wagler under the name of *Gryphus*.

We are indebted to Sir H. T. De la Beche and the Rev. W. D. Conybeare principally for pointing out and illustrating the structure of this extraordinary creature; and that at a time when the materials were far more scanty than they are at the present day. Dr. Jæger, Mr. Hawkins, Dr. Buckland, Sir Philip de Malpas Grey Egerton, and Mr. Owen, have all contributed to throw light on the organisation of a being that has long ceased to exist; and the anatomy and animal economy of this tyrant of the seas of former ages is now nearly as well known as that of the porpoise, which revels in the ocean that washes the shores of our existing continents and islands.

'If,' writes Dr. Buckland, in his 'Bridgewater Treatise,' 'we examine these creatures with a view to their capabilities of locomotion, and the means of offence and defence which their extraordinary structure afforded to them, we shall find combinations of form and mechanical contrivances which are now dispersed through various classes and orders of existing animals, but are no longer united in the same genus. Thus, in the same dividuals the snout of a porpoise is combined wi the teeth of a crocodile, the head of a lizard wi the vertebræ of a fish, and the sternum of *Ornithorhynchus* with the paddles of a wha The general outline of an Ichthyosaurus must ha most nearly resembled the modern porpoise a grampus. It had four broad feet or paddles, a terminated behind in a long and powerful t Some of the largest of these reptiles must have ceeded thirty feet in length.' These aqua reptiles fed upon fishes, as is proved by the m of fish scales (chiefly referable to the *Pholidop rus limbatus*), intermingled with coprolite throu out the entire region of the ribs, and in the m matured coprolites themselves. They also devou other animals and even the weaker of their o species. Their prey was transmitted into a stom which must have been nearly coextensive with cavity of the body, and the contents were the made to pass through an intestinal canal wh appears to have resembled, as Dr. Buckla observes, the spiral intestines of some of the swift and most voracious of our modern fishes.



Ichthyosaurus communis.

Armed with enormous jaws and teeth, and furnished with huge glaring eyes, protected by bony sclerotic plates, and constructed either for subaquatic or aerial vision, the Ichthyosauri were admirably adapted for their oceanic home, and their life of oceanic warfare. They could give chase to their prey along the surface, pursue it into the depths, and reascend with the utmost rapidity. In fact, their whole structure befitted them for an aquatic abode, and betokens their carnivorous appetite. Several species have been discriminated, and it is probable that a rigorous examination may bring others to light. We may enumerate as examples *Ichthyosaurus communis; Ich. tenuirostris; Ich. intermedius.*

For some observations on certain peculiarities in the cervical vertebræ of the Ichthyosaurus hitherto unnoticed by Sir Philip Egerton, see 'Geol. Trans.,' June, 1836. See also some remarks by Professor Owen, in 'Geol. Proc.,' 1838; and Dr. Buckland's 'Bridgewater Treatise.' A noble collection of relics of Ichthyosauri is contained in the British Museum.

Ichthyosauri abound throughout the lias and oolitic formations. The chief repository has been hitherto considered to be in the lias at Lyme Regis; but, as Dr. Buckland states, they abound along the whole extent of this formation throughout England, from the coasts of Dorset, through Somerset and Leicestershire, to the coast of Yorkshire. The lias of Germany and France contains them. 'The range of the genus Ichthyosau says Dr. Buckland, 'seems to have begun with Muschelkalk, and to have extended through whole of the oolitic period into the cretac formation. The most recent stratum in which remains of this genus have yet been found is chalk marl at Dover, where they have been covered by Dr. Mantell: I have found them i gault near Benson, Oxon.' (*Bridgewater Tre*

I'CICA, a genus of plants belonging to natural order *Burseraceæ*. *I. heterophylla* tree 50 feet in height, growing in Guyana, o banks of the river Couron. When an inc is made in the bark of this tree, a yellow samic aromatic fluid exudes, which retain fluidity a long time after exposure to the air resin is found also in the seeds, and the n of Guyana carry the nuts about with the account of the scent they give out. The C also use the exudation for mixing with oil which they anoint their bodies. *I. hepta* is a small tree, a native of the woods of Gu possessing the same properties as the f species. There are many species of *Icic* of which yield a resinous sweet-scented gum

ICOLMKILL. [IONA.]

ICOSA'NDRIA, one of the classes i sexual system of botany invented by Lin The name was applied by Linnæus to having an indefinite number of stamens in into the calyx.

ICTIDES, a name given by M. Valenciennes to Benturongs, a genus of plantigrade carnivorous Mammalia, which had been formerly referred by Cuvier to the genus *Paradoxurus*. It is the genus *Arctictis* of Temminck.

General Character.—Head rather short, muzzle ...nted; ears, which are small, tufted with long ...rs; tail long, hairy, prehensile; five toes on ...h foot. Dental formula:—

$$\text{...isors, } \frac{6}{6}\text{; Canines, } \frac{1-1}{1-1}\text{; Molars, } \frac{5-5}{5-5} = 36.$$

Geographical Distribution, India, Malacca.

The author of the 'Analytical Notice of Books' ('Zool. Journ.,' vol. ii.) says, when reviewing the 'Histoire Naturelle des Mammifères,' Nos. XLI. L., that between the Viverrine family and that ...ich is composed of the racoons and bears there ...d existed a considerable gap, which is now in a ...t measure filled up by the newly discovered ...ns, the Benturong and the Panda. The ex...nal appearance, he remarks, of the Ictides cor...ponds in some degree with both that of the ...ts and racoons, having the plantigrade motion the latter and the slender snout of the former. ...is indeed completely plantigrade, and has on ...h foot five toes armed with strong compressed ...ws, apparently adapted for climbing. 'Its tail, ...thickness of which at its commencement is ...ost monstrous, is prehensile beneath, without ...ng terminated by a naked skin, like that of ...les, but resembling entirely the tail of the ...ons. The eye, like that of the domestic cat, ...the pupil vertically elongated; the habits of Ictides are consequently nocturnal. The ears ...small and rounded; and the nostrils are sur...nded by a muzzle, which is divided into two ...tions by a deep sulcus. The hairs are long ...thick, and a peculiar character is given to the ...siognomy by the moustaches, which are very ...minous on the lips, the eyes, and the cheeks, ...by the pencil of long and numerous hairs ...ich terminates the ears. The cry is interme...e between those of a cat and a dog.'

Three species are recorded: we select *Ictides ...ricens*.—Fur gray; hairs long, silky, black ...the base, and white in their extreme third, ...ter on the head and limbs; sides of the snout, ...head, pencils of the ears (which are edged with ...e) black; upper part of snout and forehead ...e; iris yellow; belly gray, with shorter hairs ...those on the upper parts of the body. Size, ...of a very large domestic cat. In another ...imen the sides of the snout, and the tail, its ...remity excepted, were gray. Locality, ...tan, Nepál. Sir Thomas Stamford Raffles ...ribes the gait of this Benturong as low and ...shing, the body being long and heavy, and ...legs short. The tail, thick at its insertion, ...ually tapers to the extremity, where it curls ...wards. In climbing trees the animal is assisted ...this tail, which is strong. One that was kept ...e many years by Major Farquhar partook both ...imal and vegetable food. Slow in motion, ...timid in disposition, the animal sleeps much ...ng the day; the night is the season of its con...tive activity.

IDA. [Candia; Troy.]

IDEA (εἶδος, from the root ϝιδ, to see), in its widest acceptation, is used to indicate every representation of outward objects through the senses, and whatever is the immediate object of thought. Like many other terms of mental philosophy, it is derived from the most eminent of the senses, that of vision. In the Platonic philosophy, the word idea signified, primarily, the archetypes of all created things as they subsist in the divine intellect, and, secondarily, the conceptions of the human understanding, by means of which the essence of a thing is conceived. Plato's own definition is very extensive: 'an idea may be attributed to whatever, as a plurality, may be indicated by the same name.'

For the term idea the schoolmen employed the word *species*, by which, Cicero tells us, the Greek word idea was usually rendered in Latin ('Top.' 7), though he himself proposed the term *forma*, which has been adopted by Kant and his followers to designate that constant element in the perception of outward objects which is independent of matter, and which the mind presents to itself in accordance with its own laws. These species the schoolmen divided into sensible and intelligible, of which we shall here extract Hobbes's succinct account. 'The philosophy-schools teach that for the cause of vision the thing seen sendeth forth on every side a visible species, (in English) a visible show, apparition, or aspect, or a being seen, the receiving of which into the eye is seeing. . . . . Nay, for the cause of understanding also the thing understood sendeth forth an intelligible species, that is, an intelligible being seen, which coming into the understanding makes it understood.' ('Of Man,' part i., c. 1.)

According to Locke, 'Ideas are whatever is the object of the understanding, whatever a man thinks, or whatever it is the mind can be employed about thinking.' In this large sense the word is generally employed by English and French writers, and also by the Germans before the time of Kant, who ascribes to idea a higher but limited signification. By idea Kant eminently designated every conception formed by the reason (as distinct from the understanding), and raised above all sensuous perception. These ideas he subdivides into, 1st, empirical, which have an element drawn from experience, for instance, organisation, a state, a church; and, 2nd, pure, which are totally free from all that is sensible or empirical, such as liberty, immortality, holiness, felicity, deity. Another division of the Kantian ideas is into theoretical and practical, according to a similar division of the reason itself. Thus the idea of truth is a theoretical idea, that of morality a practical idea.

IDENTITY signifies sameness. In this sense it is employed in the phrase personal identity, where it signifies the invariable sameness of the thinking subject, or the I. In a secondary sense it denotes a merely relative identity, which may also be called logical or abstract. Thus, in logic, whatever things are subjects of the same attribute or collection of attributes are considered the same; *e.g.* dog and lion are the same relatively to the common notion quadruped, under which they are

both contained. Again, in physics, a tree may be asserted to be the same in relation to all the rights of property, notwithstanding the physical change it undergoes from the constant segregation of old and aggregation of new particles. Lastly, it is only in this logical use of the term that we can be said in memory to be conscious of the identity of the reproduced and the original idea; for, if they were absolutely identical, it would be impossible to distinguish between the first appearance and the recurrence of an idea.

According to Butler it is impossible to define the idea of personal identity, but it is easily ascertained; for a comparison of one's self in any two moments of our existence suggests immediately the idea, and at the same time the identity of ourselves.

(Butler, *Two Dissertations on Personal Identity.*)

IDES. [KALENDAR.]

IDIOT. [LUNACY.]

IDOCRASE, *Vesuvian, Pyramidal Garnet,* &c. This mineral occurs crystallised and massive; the crystals are either attached or imbedded. Primary form a square prism. Colour various shades of brown, black, gray, blue, green, and yellow. Lustre vitreo-resinous. Translucent and transparent. Specific gravity 3.08 to 3.4.

The massive varieties are amorphous; the structure is fibrous, granular, or compact. The component ingredients of this mineral are silica, alumina, lime, oxides of iron and manganese.

IDUMÆA (Ἰδουμαία), usually called Edom in the New Testament, included, in the time of Christ, a considerable portion of the southern part of Palestine, and extended S. W. as far as the Lake Serbónis; but in the Old Testament it was used to designate the mountainous district N. of Arabia which extended from the S. of the Dead Sea to the Bay of Ælana in the Red Sea. The Edomites, who were descendants of Esau, originally dwelt on Mount Seir. They were governed by kings from the earliest times, and appeared to have possessed considerable power when the Israelites invaded Canaan. They were defeated by Saul, and were made tributaries of the Jews during the reign of David.

After the division of the Jewish kingdom, the Edomites continued subject to Judah till the reign of Joram, when they again established their independence. They were subdued again during the reigns of Amaziah and Uzziah; but in the reign of Ahaz the Syrians seized upon Elath, and drove the Jews out of Edom. Edom, in common with the rest of Syria, appears to have been subdued by Nebuchadnezzar; but, after the downfal of the Babylonish empire, the Edomites are again mentioned as an independent people. They appear about this period to have been driven from their original settlements by the Nabathæi, who are supposed to have been descended from Nebajoth, the eldest son of Ishmael. The Edomites were constantly at war with the Jews after the return of the latter from Babylon, till they were entirely subdued by John Hyrcanus. From this time the Edomites were regarded as a part of the Jewish nation, and were governed by a prefect appointed by the Asmonæan princes of Judæa. One of these governors, Antipater, a nativ of Idumæa, was appointed by Julius Cæsar pro curator of Judæa, and was succeeded by his son the celebrated Herod, who put an end to th dynasty of the Asmonæan princes.

The Idumæans marched to the assistance o Jerusalem when it was besieged by Titus, and entered the city; they did not however continu till it was taken, but returned to their own country laden with plunder. We have no fur ther mention of the Idumæans in history Origen, in his 'Commentary upon Job,' inform us that the name of Idumæa did not exist in his day, and that the inhabitants of the country were called Arabs, and spoke the Syriac lan guage.

Ptolemæus is the only author who applies th name of Idumæa to the country west of th Jordan. The whole of Judæa was frequently called Idumæa under the Roman emperors.

IDYLL (Greek, εἰδύλλιον; Lat. *Idýllium* o *Edyllium*) is a poem, in which the appearance of external nature, or manners and sentiments are described, or both. The bucolic poems o Theocritus are called idylls; and all the bucoli poetry [BUCOLICS] may be included under thi name, though the ancients did not, any mor than ourselves, confine the name to bucolic poetry

IGLAU. [MORAVIA.]

IGNA'TIUS, one of the apostolic fathers. H was one of the earliest successors to St. Paul (not the next) in the presidency over the Christia Church at Antioch. During the persecution o that body by Trajan, Ignatius refused to abando his opinions, and the issue was that he was sent t Rome, and there put to death in a very cru manner, being thrown to the lions in a publi spectacle. What little was left of the feeble ol man was gathered by a few friends, and remove to Antioch, and preserved there as sacred relics.

The remains of St. Ignatius, which are pr served to us, are four short epistles addressed the Romans, the Philadelphians, the Smyrnæan and to Polycarp. An English translation may b found in Archbishop Wake's 'Genuine Epistles the Apostolic Fathers,' London, 8vo., 1693.

IGNA'TIUS, Patriarch of Constantinople, w born in 799, and was the son of the Emper Michael Curopalates, who, on the revolt of L the Armenian, surrendered to him the thron and embraced the monastic life. His sons f lowed the example of their father, and t youngest, Nicetas, then aged fourteen, chang his name into that of Ignatius. The new e peror separated the several members of the fam of Michael, and caused his two sons Eustrati and Nicetas to be made eunuchs.

Ignatius was admitted into the order of prie hood by Basil, Bishop of Paros, in the H lespont. Under the regency of the Empr Theodora, Ignatius was elected Patriarch Constantinople. In consequence of his refusal join the young Emperor Michael in an attempt overturn the rule of his mother, he was depri of his see, and banished. But he was eve ually restored by the authority of a cou presided over by the legate of Pope Adrian

and from that time was allowed to rule the Greek Church without opposition. He died on the 23rd of October, 878, on which day the Greek and Roman Churches still celebrate his memory.

IGNATIUS LOYOLA. [Jesuits.]

IGNIS FATUUS, a meteor resembling a flame, which floats in the atmosphere at a few feet above the surface of the ground. It is generally observed by night, either stationary or in motion, over marshes or burial grounds; and sometimes, after becoming invisible, it reappears. Occasionally such meteors have been observed to follow or advance towards a spectator; but in general they appear to recede on being approached, and it has happened that, from their resemblance to the flame of a distant lamp, they have led the unwary traveller into dangerous swamps.

A plausible hypothesis which has been proposed in order to account for this phenomenon is that a phosphuretted or a carburetted hydrogen gas, produced by the decomposition of animal or vegetable substances, rises from the ground or from stagnant water, and takes fire by electricity or spontaneously, at a spot where the atmosphere is particularly free from moisture. Spontaneous ignition is well known to take place occasionally in a number of vegetable and animal substances while undergoing decomposition, in consequence of the inflammable matter coming in contact with common air or with oxygen gas.

IGUALDAS. [Catalunia.]

IGUA'NA, a restricted genus of Saurian reptiles, belonging to the section *Pleurodonta* of the family *Iguanidæ*. (Duméril and Bibron, in 'Erpétologie Générale.')

The *Pleurodonta*, with the exception of one genus, are all confined to America, and are characterised by the teeth being implanted, not along the ridge of the jaw, but in a furrow along the side of the jaw, to which latter they adhere by one side of the bony substance of the root, without being implanted in the jaw itself like a nail in a board.

The genus *Iguana*, as at present restricted, contains, according to M. Bibron, only three species, natives of Brazil, Cayenne, the Antilles, the Bahamas, Mexico, &c. They attain to considerable dimensions, and have a fierce and strange aspect. Their flesh is esteemed a delicacy.

The Iguanas (or Guanas) are characterised by a cutaneous expansion like a pendent dewlap, or flaccid pouch, under the lower jaw and throat, which is capable of being inflated; and there are cuticular folds on the lateral regions of the neck and throat. The head is stout at the base, moderately long, and of a somewhat pyramidal shape, covered with plates forming a sort of tesselated pavement. The scales of the body are small, almost lozenge-shaped, slightly keeled, and but little imbricated. A serrated dorsal crest, consisting of elevated, compressed, and pointed scales, runs along the ridge of the back, and also of the tail to its tip. The tail is of great length, very flexible, and laterally compressed. The orifice of the ear is covered by a large tympanic membrane, and generally there are several large scales about the angle of the lower jaw. The limbs are long; the toes unequal, rough with elevated points on the under surface, and armed with acute claws. A range of tuberculous pores runs along the inside of each thigh. The colour of the Iguana is yellowish green below, and above of a green more or less deep, becoming sometimes bluish, and sometimes a slate-colour.

The Iguanas, of which three species are known, are arboreal in their habits, and feed principally on vegetable aliment; indeed, in the stomachs of the numerous specimens examined by M. Bibron, nothing but leaves and flowers were found. Dr. Buckland however states that in 1828 Captain Belcher found in the island of Isabella swarms of Iguanas which appeared to be omnivorous, feeding voraciously on eggs, on the intestines of fowls, and on insects.

These animals haunt the borders of water, into which they often plunge and swim with great velocity, lashing their tail from side to side. During the pairing season the male is very savage, watches over his mate, and defends her with fury. The female deposits her eggs along the margin of rivers, in savannahs, or on the sea-shore, burying them in the sand. Both the eggs and the flesh of these animals are in great request, insomuch that in some of the islands, where the Iguana was very common, as, for example, Jamaica, it is now very rare. They are taken by nooses, in traps, or nets, and sometimes are hunted by dogs. They are very tenacious of life, and, as they struggle violently, snapping at every person, are generally despatched as soon as captured.

The Common Iguana (*Iguana tuberculata*, the *Iguana delicatissima* of Daudin) is a native of Brazil, Cayenne, the Antilles, and the Bahamas. It attains to a considerable size, sometimes measuring six feet in length, including the long tail. Formerly, according to Catesby ('Nat. Hist. of Carolina,' 1743), this species was an important article of commerce in the Bahamas, and cargoes of living Iguanas, or salted Iguanas, and also of their eggs, were imported into the Carolinas. The practice was to sew up the mouths of the living animals in order to prevent them from biting. They were as eagerly sought after by the epicures of the Carolinas and other places as the turtle is by the epicures of our island.

IGUANI'DÆ, an extensive family of Saurian reptiles, divided by MM. Duméril and Bibron in their 'Erpétologie' (1837) into two subfamilies, viz *Pleurodonta* (Pleurodontes) and *Acrodonta* (Acrodontes). In the *Pleurodonta* the teeth are not implanted in the ridge of the jaw, but are affixed in a furrow along the side of the jaw, adhering to the latter by one side of their bony root. The *Pleurodonta*, with the exception of one genus (*Brachylophus*, an Indian group), are all peculiar to the New World and the adjacent islands. The genus Iguana may be regarded as a typical form.

The *Acrodonta* are distinguished by the teeth being seated on the ridge of the jaws, to which they are soldered, and of which they appear to be a continuation. This subfamily is distributed through Asia, Southern Europe, Africa, and Australia.

The genera comprehended under the family group *Iguanidæ* are very numerous; those of the *Pleurodonta* constitute five tribes, viz. *Anolians, Polychrians, Iguanians, Tropidolepidians,* and *Oplurians.* Those of the *Acrodonta* constitute four tribes, viz. *Galeotians, Agamians, Phrynocephalians,* and *Stellionians.*

IGUA'NODON, the name of an extinct gigantic reptile, whose remains were discovered by Dr. Mantell. In its characters this fossil Saurian closely approaches to the genus *Iguana*, and there can be no doubt that it was herbivorous; indeed Cuvier, at first sight, took the teeth for those of a rhinoceros. Dr. Buckland, who dilates on the admirable structure of these teeth, considered with relation to the demands made by the habits of the animal, observes how well they are adapted for cropping tough vegetable food, such as the *Clathraria* and similar plants which are found buried with the Iguanodon. 'The teeth,' writes Dr. Buckland, 'exhibit two kinds of provision to maintain sharp edges along the cutting surface, from their first protrusion until they were worn down to the very stump. The first of these is a sharp and serrated edge, extending on each side downwards, from the point to the broadest portion of the body of the tooth. The second provision is one of compensation for the gradual destruction of this serrated edge, by substituting a plate of thin enamel, to maintain a cutting power in the anterior portion of the tooth, until its entire substance was consumed in service. Whilst the crown of the tooth was thus gradually diminishing above, a simultaneous absorption of the root went on below, caused by the pressure of a new tooth rising to replace the old one, until, by this continual consumption at both extremities, the middle portion of the older tooth was reduced to a hollow stump, which fell from the jaw to make room for a more efficient successor.'

The size of this giant of the Weald in former ages was enormous. In Dr. Mantell's collection there is a portion of a femur twenty-two inches in girth in the smallest part. The thigh bone, then, of the Iguanodon exceeded in bulk that of the largest elephant, and its length is on good grounds calculated to have been from four to five feet. Dr. Mantell carefully compared the bones of the Iguanodon with those of the Iguana, and, by taking an average from eight separate parts of the respective skeletons, he gives the following as the dimensions of the Iguanodon :—

	Feet.
Length from snout to end of tail . .	70
Length of tail	52½
Circumference of body	14½

Geological Distribution.—The Wealden freshwater formation of the south of England, intermediate between the marine oolitic deposits of the Portland stone and those of the green-sand formation in the cretaceous series. Tilgate Forest. Isle of Wight. Purbeck. Rag-quarries, near Maidstone.

ILCHESTER. [Somersetshire.]

ILDEFONSO, S. [Castilla-la-Vieja.]

ILE-DE-FRANCE, one of the old provinces of France, was bounded N. by Picardie, W. by Maine and Normandie, S. by Orléanais, and E. by Champagne. It now forms the departments of Seine, Seine-et-Oise, Oise, and a part of those of Seine-et-Marne, Aisne, and Eure-et-Loir. Paris was its capital. This province formed part of the monarchy under the first kings of France, and was governed by the dukes or counts of Paris, who were numbered among the great vassals of the crown. It was united to the crown in the year 987 under the reign of Hugues Capet.

I'LEUS, or ILIAC PASSION, is the name given to a severe form of intestinal disease characterised by violent griping pain around the umbilicus, spasm and retraction of the muscles of the abdomen, obstinate costiveness, and vomiting. These symptoms are however common to several very different conditions of the bowels, as colic, hernia, intussusception, &c.

ILEX is a name given to two very different plants. As that of a species, it indicates the Evergreen Oak of the south of Europe, or *Quercus Ilex.* As that of a genus, it belongs to the common Holly, *Ilex aquifolium.* This latter is common in the middle of Europe, and the southern side of the range of the Caucasus, where it is only a bush, and it probably extends far to the eastward. It is chiefly valued as an ornamental tree, but its fine-grained, heavy, compact timber is used for a great number of useful purposes, especially by the turner and mathematical instrument maker. The berries are poisonous, producing purgative and violent emetic effects.

Besides the common Holly and its numerous varieties, the genus Ilex comprehends a large number of species, the most remarkable of which are the *I. Balearica,* or broad-leaved species of Minorca, a very handsome kind, which is hardy in the middle and south of England; the *I. vomitoria,* or Cassena Tree of the North Americans, whose leaves possess strongly marked emetic qualities; and the *I. Paraguayensis,* the Maté plant, of whose leaves a very large consumption takes place in South America under the name of Paraguay Tea. The leaves are dried and afterwards used like the common tea.

ILFRACOMBE. [Devonshire.]

ILIAD. [Homer.]

ILISSUS. [Attica.]

ILIUM. [Troy.]

ILKESTON. [Derbyshire.]

ILLE-ET-VILAINE, a department in France, formed out of a portion of the old province of Bretagne, is bounded N. by the English Channel and the department of La Manche, E. by the department of Mayenne, S. by that of Loire Inférieure, and W. by those of Morbihan and Côtes-du-Nord. It lies between 47° 37′ and 48° 31′ N. lat., 1° and 2° 13′ W. long., measuring 74 miles from N. to S., and 55 from E. to W. The area is 2582 square miles. The population in 1846 was 562,958, which gives 218.0 to the square mile, being 44.25 above the average of the square mile for all France*.

* The census of 1841, which has been used thus far in the account of the French departments, gave an average of 168 inhabitants to the square mile for all France; the census of 1846, which was published only recently, and will be used for the rest of this work, raises the average to 173.75.

The department is divided by the Armoric hills [CÔTES-DU-NORD; BRETAGNE] into two slopes, one of which inclines to the English Channel, the other to the Bay of Biscay. It presents a great variety of hill and dale, heaths, moors, forests, ponds, and marshes, which are rendered productive by drainage, or on the coast by banking out the sea. The soil, except in the marsh land, is shallow and light; the most fertile soils are in the neighbourhood of St.-Malo, Montfort, and Rennes, and in the marshes north of Dol. The coast, which extends between the embouchures of the Couesnon and the Rance, measures about 40 miles; it is washed by the fine Bay of Cancale; but access to it is much impeded by a great number of isolated rocks and islets. St.-Malo in the north and Redon in the south of the department, are the most important ports.

The department takes its name from the Ille and the Vilaine, the two principal rivers. The *Ille* rises near Combourg, N. of the Armoric range, through a gap in which it runs S. and joins the Vilaine on the right bank at Rennes after a course of about 20 miles. Its waters supply the *Ille-et-Rance* Canal, which runs a considerable way along the Ille, and then, turning N.W., joins the Rance, a little above Dinan. [CÔTES-DU-NORD.] The *Vilaine* rises a little W. of Ernée, in the department of Mayenne, and runs generally W. past Vitré as far as Rennes, 5 miles above which it becomes navigable. Having received the Ille at Rennes, its course is S.S.W. past Redon, whence to its mouth in the Bay of Biscay, below Roche-Bernard, it is a tide river and navigable for vessels of 250 tons. Its whole length is 116 miles, 78 of which are navigable. On the right it receives the Canlache, the Chèvre, the Ille before mentioned, the Meu and the Oust [MORBIHAN]; on the left its feeders are the Seiche, the Semnon, the Cher, (which enters it on the borders of Loire-Inférieure), and the Don and the Isac, which flow from Loire-Inférieure, and are both navigable. The *Couesnon* rises E. of Fougères, and runs first W., then N. past Antrain, and enters the Bay of Cancale, below Pontorson, in the department of Manche. It is navigable at high water for barges from Antrain. The Rance is described under CÔTES-DU-NORD. The department is traversed by 11 royal, 12 departmental, and 4 military roads; the railroad from Paris to Brest, now in course of construction, passes Vitré and Rennes.

The department contains 1,652,446 acres, distributed among 151,647 proprietors, and into 1,614,251 parcels. Of this surface, 982,269 acres are arable; 181,256 are natural pasture; 32,621 are covered with orchards, nurseries, and gardens; 255,909 acres are heath and moorland; 147,016 acres are under woods and forests; 12,912 acres are covered with wet marshes, rivers, canals, &c.; and 341 acres are under vine-culture. The farms are small, the largest not exceeding 75 acres, and many consist of not more than 5. The soil is made to produce all kinds of breadstuffs, in quantity more than enough for the wants of the population. In the rich soils, wheat of excellent quality is raised; tobacco is grown near St.-Malo; rye, barley, oats, buckwheat, and mixed grain are produced in the middling and poorer soils. The cultivation of flax and hemp for the manufactures of the department is very extensive; the flax and hemp in the dressed state, as also the seeds, are important objects of commerce. The apple and the pear are very extensively cultivated for making cider and perry, the chief drinks of the population; the cider is strong enough to keep for two years, and is considered the best made in France. The grass land along the river bottoms is rich; and, as the outlet on the heaths and moors is large, great numbers of cattle are reared, and excellent butter and cheese are made. There is little meadow land; of artificial grasses only clover is grown. Horses in general of small breed, sheep, goats, poultry, and pigs of the large white breed, are numerous. Game, including wild boars, hares, rabbits, partridges, quails, woodcocks, &c., are abundant. The fisheries on the coast, which are actively plied, yield excellent oysters, soles, lobsters, turbot, skate, crabs, &c. The forests of the department contain fine timber: the prevailing kinds are oak and beech; next come chestnut, poplar, and birch. The cultivated land also presents the appearance of a forest, such is the number of apple trees planted in the fields, and of timber trees in the hedges that separate each field; but, as these latter are regularly stripped of their branches to supply fire-wood, they are of little value as timber.

Several iron mines are worked; roofing and clay slate, white quartz for the glass factories, limestone, and granite are quarried; lead and copper ore are found. Mineral springs are numerous.

The most important manufactures are linen, sailcloth of the best quality, Russia duck, canvass, and shoe and morocco leather; felt and straw hats, sewing thread, thread stockings, ship cordage and ropes, fishing nets, hooks and lines, pottery, cotton and woollen yarn, are also made. There are besides, several bleaching establishments, brandy distilleries, paper-mills, iron-forges and smelting furnaces, and flour-mills; in the towns on the coast shipbuilding is carried on to some extent. Salt is made in some of the marshes on the coast. The commerce is composed of the various articles named, and of groats, chestnuts, salt pork, hides, oak staves, firewood, &c. About 300 fairs are held in the year; there are 990 wind and water mills, 7 iron-works, and 63 factories of different kinds.

The climate is damp but temperate; much rain falls in winter; the prevailing winds are the west, north-west, and south-west; hurricanes are less frequent and less destructive than in some of the more western departments.

The condition of the peasantry is similar, but rather superior, to that of the peasantry of FINISTE'RE. The department contains many Druidical and Celtic remains, consisting of monoliths (menhirs), altar tables (dolmen, kistvaen), cromlechs, and cairns.

The department is divided into 6 arrondisse-

ments, which with their subdivisions and population are as follows :

Arronds.	Cantons.	Communes.	Pop. in 1846.
Rennes . . .	10	79	137,600
Fougères . .	6	57	84,458
Montfort . .	5	46	58,980
St.-Malo . .	9	62	120,890
Vitré . . .	6	65	82,056
Redon . . .	7	46	78,974
Total . .	43	355	562,958

Of the arrondissement of Rennes, and of the whole department, the capital is RENNES. *Hédé*, a small place of about 1000 inhabitants, on the road from Rennes to Dinan, is remarkable for the remains of its ancient castle, which was taken by Henry II. in 1168. *Janzé*, S.S.E. from Rennes, has 4304 inhabitants, who manufacture sailcloth, and deal largely in excellent poultry. *Liffré*, N.E. of Rennes, has a population of 2402. *Mordelles*, S.W. of Rennes, on the left bank of the Meu, has mineral springs and 2613 inhabitants.

In the arrondissement of Fougères the chief town is *Fougères*, which stands on a hill, at the intersection of five high roads, in the north-east of the department. It is one of the best built towns in the department, has wide, straight streets, a tribunal of first instance, a college, and 4635 inhabitants, who manufacture sailcloth, canvass, tape, flannel, lace, hats, bricks, leather, paper, and glass. There is a good commerce in these articles, and in corn, groats, butter, honey, cattle, &c. The castle of Fougères is a picturesque object, but a feeble defence, as it is commanded by the higher part of the town. In the forest of Fougères, within half a mile of the town, there are many Druidical remains. *Antrain*, N.W. of Fougères, on the left bank of the Couesnon, which here becomes navigable, has a population of 1567, and some manufactures of linen, coarse woollens, serge, and leather. *St.-Aubin-du-Cormier* stands on a steep hill, S.W. of Fougères, and has 1896 inhabitants. It owes its origin to a strong castle built by Pierre de Dreux, duke of Bretagne, in 1223, and is famous for the victory gained here by the Count de la Tremouille, the commander-in-chief for Charles VIII., over François II., duke of Bretagne, the Prince of Orange, and the Duke of Orléans (afterwards Louis XII). *Louvigné-du-Désert*, 9 miles N. from Fougères, had formerly a large establishment belonging to the Templars, whose church is now become the parish church. It has a population of 3524, and several tanyards.

In the arrondissement of Montfort, the chief town *Montfort-sur-Meu*, situated 10 miles W. from Rennes, on a hill above the confluence of the Meu and the Chailloux, has a tribunal of first instance, a college, and 1868 inhabitants. It is closed in by ramparts, flanked with towers, and encircled by a wide ditch. The town was formerly of much larger size. In the environs, which are very pretty, are the oak forests of Brescilien and Montfort, in the former of which are several Druidical remains; among others the tomb of the enchanter Merlin, so celebrated in Breton Fables. *St.-Méen*, 10 miles W. from Montfort, has an ecclesiastical school, and 2319 inhabitants. *Montauban*, formerly the chief town of a county belonging to the dukes of Rohan, is 7 miles N.N.W. from Montfort, and has a population of 2764. *Plélan-le-Grand*, 12 miles S. by W. from Montfort, has 3283 inhabitants, who manufacture great quantities of sewing thread.

In the arrondissement of St.-Malo, the chief town *St.-Malo*, is built on the rocky isle of Aron, which communicates with the main-land by a causeway named le Sillon, and defended from the violence of the waves by strong outworks. The town covers the whole island ; it is surrounded by strong ramparts, which are flanked with towers and bastions, and form a fine promenade. The streets are narrow, but formed by high and in general well-built houses. There are four gate entrances, near one of which, called la Grande Porte, is a large reservoir, whence water is supplied to the fountains in the streets. The most remarkable building is the strong castle built by Anne, duchess of Bretagne, which forms part of the fortifications. The former cathedral is a very capacious church, built in the Gothic style, and ornamented with several good marble statues. St.-Malo has tribunals of first instance and of commerce, a chamber of commerce and manufactures, a naval school of the first class, and 10,053 inhabitants. The harbour lies S. of the town ; it is capacious and safe, but the entrance to it is rendered intricate by a great number of islets and rocks which stud this part of the coast, and many of which are fortified. It is a tide harbour, protected by a strong pier, and lined with a broad quay, which runs just under the walls of the town ; it is dry at low water, but large ships can enter, as the tide rises very high here, 49 feet at spring. A wet dock has been lately formed by throwing a strong granite wall across the head of the bay between the town and the suburb of *St.-Servan ;* it contains an area of above 270 acres, and is entered by wide flood-gates, through which steamers and war frigates can pass. The roadstead of St.-Malo lies W. of the town at the embouchure of the Rance ; it is protected by 7 forts, one of which called Conchée was constructed by Vauban. The manufactures of St.-Malo are hosiery, fishing-nets, ship pulleys and cordage, soap, fishing-hooks, &c. Shipbuilding is carried on, and there is a large tobacco factory. The imports consist of colonial produce, spices, flax, hemp, &c. ; there is also a considerable trade in corn, fruit, wine, brandy, salt, linen, cider, butter, honey, fish, salt provisions, &c. Vessels are fitted out for the foreign and coasting trade, and for the whale, cod, and mackerel fisheries. St.-Malo is much frequented as a bathing town. *Bousse*, near Dol, is a small place, with 2801 inhabitants. *Cancale*, a small seaport on the western side of the Bay of Cancale, with 5230 inhabitants, 8 miles E. from St-Malo. The principal part of the town stands on a height, above the bay, which it commands a fine view, and is well built. The other part, called La-Houle, is built on the shore, and is inhabited chiefly by fishermen, who take vast quantities of oysters and other fish

the bay for the supply of Paris and the towns in the interior. *Combourg*, the birth-place of Chateaubriand, 20 miles S.S.E. from St. Malo, is situated on a small lake, and has 4847 inhabitants. There is an old château, flanked with towers, in good preservation in the town. *Dol*, remarkable for its ancient cathedral, which is one of the handsomest churches in Bretagne, is 15 miles S.E. from St.-Malo, and has 4018 inhabitants. It is surrounded by old walls and wide ditches, the remains of its ancient fortifications. The interior is irregularly built; the houses are constructed of dark granite with projecting gables; arcades 7 or 8 feet wide, supported on granite pillars, run along the streets. The town has a good corn-market, which is held in a desecrated church; there is also some trade in cider, hemp, flax, tobacco, cattle, &c. The neighbourhood of Dol is fertile; all the land between it and the sea northwards is drained marsh, protected from the sea by dikes. *Pleine-Fougères*, 25 miles from St.-Malo, has a population of 3107. *St.-Servan*, a well-built town, and much frequented watering-place, situated on the south-side of the harbour of St.-Malo, of which town it may be considered a suburb, has 10,257 inhabitants. The most remarkable structure is the isolated tower called Solidor, which is 60 feet high, and approached by a drawbridge. This tower is now used as a prison. Beer, ship cordage, and biscuits, wine, brandy, &c., are the chief articles of trade; shipbuilding is carried on. *Tinténiac*, on the Ille-et-Rance Canal, has 2050 inhabitants, who trade in corn, butter, poultry, &c.

In the arrondissement of Vitré, the chief town *Vitré*, situated on the Cantache, 22 miles E. from Rennes, has a tribunal of first instance, an ecclesiastical school, and 8610 inhabitants. The town is large, but irregularly built; and its feudal fortifications, consisting of a castle, high ramparts flanked with machicolated towers, and surrounded by a deep ditch, give it a gloomy appearance. The church of Notre-Dame is the most remarkable structure in the town. Vitré has manufactures of thread stockings, serge, flannel, hats, casks, brandy, leather, and sailcloth, and trades in these articles, and in wine, linen, honey, wax, hides, cattle, and cantharides flies, which are found in the neighbourhood. The other towns are *Argentré*, which is a few miles S. of Vitré, and has 1978 inhabitants: *La-Guerche*, a town of 4412 inhabitants, which stands in a rich corn and grazing country, 11 miles S. from Vitré; it gives name to a neighbouring forest, and has manufactures of fine linen, leather, and nut oil, besides a good trade in butter, corn, flax, hemp, chestnuts, cattle, sheep, &c.: and *Rhetiers*, which is a few miles W. of La-Guerche, and has 2960 inhabitants.

Of the arrondissement of Redon the chief town *Redon* stands at the foot of a hill on the Vilaine, which here forms a good tide harbour, with a rise of from 10 to 13 feet at high water. The town, which is situated in the most southern angle of the department, at the junction of the two branches of the canal from Nantes to Brest, and at the southern extremity of the river and canal navigation that terminates to northwards in the harbour of St.-Malo, enjoys great advantages for trade, in addition to its connection with the Bay of Biscay by a navigable tide river. It is in general well built; the chief structures are the former abbey buildings now used as a college, and the abbey church, the semicircular apse of which is considered a masterpiece. Redon has a tribunal of first instance, a college, and 4606 inhabitants, who carry on a considerable trade in colonial produce, wine, brandy, salt, butter, chestnuts, timber, hemp, oak staves, planks, masts, pitch and tar, slates, quarried in the neighbourhood, sheet and bar iron, lead, resin, hides, linen, flax, canvas, &c. Vessels of 50 to 400 tons are built. A vote of 1,800,000 francs was taken in 1846 for the improvement of the harbour of Redon, to which the French attach great importance, as, in case of a war with England, their trading vessels could enter here without exposing themselves in the Channel. The other towns are—*Bain*, which stands on the great road from Rennes to Nantes, and has a population of 3476, and some woollen manufactures: *Fougeray*, 16 miles N.E. from Redon, which has 5254 inhabitants; it had formerly a strong castle, of which only one high massive tower remains, and from which the English were driven by Du Guesclin in 1356: *Guichen*, which is 25 miles N.N.E. from Redon, and has cold mineral springs, and 3534 inhabitants: *Maure*, 15 miles N. from Redon, which has a population of 4001, and an ancient castle taken by Henri IV. in 1597: and *Pipriac*, 12 miles N. from Redon, which has 3116 inhabitants.

The department forms the see of the bishop of Rennes, is included in the jurisdiction of the Cour Royale and University Academy of Rennes, and belongs to the 13th Military Division, of which Rennes is head quarters. It returned 7 members to the Chamber of Deputies; it now has 14 representatives in the National Assembly.

(*Dictionnaire de la France; Annuaire pour l' An* 1849; *Decree of the Provisional Government of the French Republic; Guide Classique du Voyageur en France.*)

ILLECEBRA'CEÆ, a small natural order of exogenous plants, chiefly consisting of herbaceous weeds, found in the temperate parts of the world. The species are often conspicuous, especially when dried, for their silvery stipules and shining calyxes, and are sometimes beautiful microscopic objects; but they are too small to be interesting in any other way, and are of no known use.

ILLICE'BRUM, a genus of plants the type of the natural order *Illicebraceæ*. The only species is a small trailing shrub with opposite leaves having scarious stipules at the base. *I. verticillatum*, Whorled Rush-Grass, is found in bogs and wet marshy places, chiefly in Cornwall and Devonshire.

ILLI'CIUM, a genus of plants now generally described as a separate family under the name of WINTERACEÆ.

ILLINOIS, one of the United States of North America, is bounded S.E. by the river Ohio; E. by Lake Michigan and Indiana; N. by the parallel of 42° 30′ N. lat.; W. by the Mississippi. It lies between 42° 30′ and 37° N. lat., and

between 87° 17′ and 91° 50′ W. long. The greatest length is about 350 miles, and the greatest breadth 180 miles. The area is 50,000 square miles. The population in 1845 was 643,482, of whom 331 were slaves.

The Kaskaskia rises on the east side of the state, and, flowing to the S.W. for about 250 miles, falls into the Mississippi about 80 miles above the junction of the Ohio. The Illinois, the largest river in the state, rises near Lake Michigan, and flows W. and S.S.W. into the Mississippi, which it joins 20 miles above the Missouri. This large river takes the name of Illinois only from the confluence of the Plane River from the N.E., and the Kankakee from the E., both considerable streams, and navigable for boats. Thirty miles below their confluence the Fox River falls into the Illinois from the north: it rises in the Huron territory, and has a course of 200 miles S.S.W., more than half of which is in this state. The other principal tributaries of the Illinois are the Vermilion River from the S.E., the Mackinaw from the N.E., Spoon River from the N.W., and the Sangamon or Sanganio from the E. The last is by much the largest of these tributaries. Rock River rises in the Huron territory, and, entering the state of Illinois on its north boundary, crosses it in a S.W. course of about 200 miles to the Mississippi.

There is a range of low hills near the Ohio, and the western part of the state has an undulating surface; but, with these exceptions, Illinois is one great plain, having a general slope to the south-west. It is estimated by Darby that every part of the state is included between the elevations of 400 and 1000 feet above the sea-level, the mouth of the Ohio being 320 feet above the level of the Atlantic. Its soil consists of alluvial lands on the rivers, dry prairie lands, wet prairies covered with coarse grass, and timbered land. It is supposed that this state contains more good arable land than any other in the Union. The minerals are iron, copper, and lead, in the north-western angle of the state. Lead mines are worked, and are very rich. Coal is found in every part of Illinois. Limestones and sandstones are the usual rocks. The climate is much the same as that of Missouri, except that it is more humid, and in general less healthy. Probably the mean heat of Illinois would not reach 53° Fahr. The agricultural products of the state are maize, wheat, hemp, flour, and tobacco. Swine are reared in great numbers from the abundant mast of the forests. There are few manufactures in the state, except those of salt from salt-springs, and lead from the ore.

Illinois is divided into 87 counties. The following are the principal towns, with the population of each in 1840:—

Springfield, near the centre of the state, is the seat of government. It has a state-house and a court-house. Population, 2579. *Alton* is 82 miles W. by S. from Springfield. Population, 2340. *Chicago*, 204 miles N.N.E. from Springfield, extends along the western shore of Lake Michigan. Numerous steam-vessels ply between this place and Buffalo. Population, 4170. *Galena*, 230 miles N. by W. from Springfield, is the chief town of the great lead district, in which were produced, in 1841, 22,000,000 lbs. Population, 1500. *Nauvoo* is 124 miles N.W. from Springfield, on the east bank of the Mississippi. Population, 7000. *Quincy*, 104 miles S. from Springfield, is situated on a bluff, on the east bank of the Mississippi. Population, 1500.

Illinois College, at Jacksonville, had, in 1847, 54 students and 5 instructors. The Methodists, Baptists, and Presbyterians are the prevailing sects. The legislature consists of 40 senators and 91 representatives. It sends 2 senators and 7 representatives to congress.

This state is within the limits of the cession which Virginia made to the United States in 1787; but the first settlements made in it were by the Canadian French before 1763. It was governed, with Indiana, as a territory of the United States from 1800 to 1809. In 1809 they were made separate territorial governments, and in 1818 Illinois was admitted into the Union, in which year its constitution was formed.

ILLYRIA, a kingdom and province of the Austrian empire, lies between 44° 43′ and 47° 5′ N. lat., 12° 40′ and 15° 55′ E. long., and is bounded N. by the provinces of Austria and Styria, N.E. by Styria, S.E. by Croatia, S. by the Adriatic, and W. by Italy and Tyrol. The area of the kingdom is about 11,000 square miles. The population in 1842 was 1,252,831. It is divided into two governments, Laybach and Trieste.

The Government of Layback has an area of 6805 square miles. It is subdivided into 5 circles—Laybach, Neustadtl, Adelsberg, Clagenfurt, and Villach, the first three of which formerly constituted the duchy of Carniola, and the two others the duchy of Carinthia. *Laybach*, the capital of the circle and government of Laybach, is situated in an extensive valley at the mouth of the navigable river Laybach, a feeder of the Save, which divides the city into two parts, connected by five bridges. Laybach with its eight suburbs has 11,275 inhabitants. It is a bishop's see, and has a fine cathedral, twelve other churches, a lyceum, a gymnasium, and many other excellent public institutions. The castle is situated on a commanding eminence. At a short distance to the north of the town there is a stone bridge of 11 arches, 540 paces in length, over the Save. *Neustadtl*, the capital of the circle of Neustadtl, is beautifully situated on the river Gurk, a feeder of the Save; it is a very pretty, regularly built town, with three churches, a gymnasium, a Franciscan convent, and 2000 inhabitants. *Adelsberg*, the town which gives name to the circle of Adelsberg, and chiefly noted for the remarkable grotto in its vicinity, is noticed under ADELSBERG. The most important town in this circle is *Idria*, famous for its quicksilver mines. It is situated at the bottom of a narrow valley surrounded by high mountains, on the banks of the little river Idria, and has 5000 inhabitants, who subsist partly by lace-making and straw-platting; but the greater part are employed in the mines and in the quicksilver works and cinnabar factories in the neighbourhood. The entrance to the mine

is nearly in the middle of the town, by a large iron gate, which opens to a horizontal passage leading to a flight of 757 steps cut in the limestone rock. *Clagenfurt*, the chief town of the circle of Clagenfurt, and formerly the capital of Carinthia, is noticed under CLAGENFURT. *Villach*, the chief town of the circle of Villach, is situated on the Drave, in a beautiful country, which has been called the Inner Austrian Switzerland. The town, which was formerly much larger than it now is, has 2400 inhabitants. Villach is a place of some importance in a commercial point of view, as it stands at the junction of three great roads leading to Vienna, Venice, and Inspruck. A few miles W. of Villach are the important lead mines of *Bleiberg*, so named from the little town of BLEIBERG, which has a population of 3600.

The Government of Trieste, which comprehends the city and territory of Trieste and the two circles of Istria (the ancient *Histria*), and Görz, has an area of 4084 square miles. *The Territory of Trieste* has an area of 40 square miles, and includes the city of TRIESTE. The chief town of the circle of *Istria*, Mittenburg or Pisino, has only 1600 inhabitants. The other most remarkable towns are *Capo d'Istria*, a seaport on an island in the Adriatic, connected with the continent by a bridge, 5000 inhabitants; *Rovigno*, on the coast S. of Capo d'Istria, 9500 inhabitants; *Pola*, celebrated for its fine Roman antiquities; *Pirano*, 6500 inhabitants; *Dignano*, 3600 inhabitants. To this circle belong the following islands in the Gulf of Quarnero:—*Cherso* and *Osero*, which are united by a bridge; chief towns, Cherso, 3000 inhabitants; Lussin Piccolo, 3500 inhabitants, the largest harbour in the Adriatic; Lussin Grande, 2218 inhabitants; and the island of *Veglia*, the chief towns of which are Veglia, a bishop's see, 1200 inhabitants, and Visca (including Visca-vecchia), 3000 inhabitants. *The circle of Görz* contains the towns, Görz, or Gorizia, 9700 inhabitants; Aquileja, 1400 inhabitants [AQUILEIA]; Grado, 2200 inhabitants; and Monfalcone, 1200 inhabitants.

Face of the Country, Soil, Climate.—Illyria is on the whole a mountainous country, but the coasts are partly low and sandy, and partly marshy, especially towards the west. On the west the Bay of Trieste, and on the east that of Quarnero, run deep into the land, and form the peninsula of Istria, the extreme point of which is Capo-Promontore. In the circles of Villach and Clagenfurt the soil is good, and the valleys are in general fertile; but a great portion of the surface is rocky, and so high that the temperature is unfavourable to vegetation. The circles of Neustadtl, Adelsberg, and Laybach consist of rock, marshes, and sandy flats, and are unfruitful. The coast has a dry limestone soil, and in many parts suffers from a scarcity of water, but the vegetation is very luxuriant. Three great chains of mountains, the Noric Alps in the north, the Julian and Carnic Alps in the centre and south, traverse the kingdom from west to east. All the mountains belonging to the chain of the Julian Alps are composed of primitive limestone, and are remarkable for the number of stalactitic caves they contain. [ADELSBERG.] The principal rivers are—the DRAVE, which is navigable, and flows for 120 miles through the circles of Villach and Clagenfurt; the SAVE, which becomes navigable at Laybach; the *Isonzo*, which rises in Mount Terglou (9300 feet high), the point of junction of the Carnic and the Julian Alps, and flowing S. enters the Gulf of Trieste, having received the Torre on the right, the Idria and the Wippach on the left bank; a few miles before reaching the gulf it divides into two branches, called the Isonzato and the Sdobba, which afterwards unite, inclosing between them the island of Morosina; the course of the Isonzo is important as having once formed the eastern limit of Italy towards Austria; and the *Quieto*, which enters the Adriatic through the harbour of Città-Nuova. Of the numerous lakes, the largest are—the Lake of Clagenfurt, 11 or 12 miles long, but narrow; the Ossiach Lake, 7 miles long; and the Mühlställer Lake, 8½ miles long, and from 2 to 3½ miles wide; this is the deepest and most beautiful lake in Carinthia, and the surrounding scenery is highly picturesque.

The most remarkable lake in Carniola is that of Zirknitz, in the circle of Adelsberg, about 3 miles long, and 2 wide, of which many wonderful stories are told, all originating in the fact that it is sometimes quite full to the brim, and at others dried up, and this without any regularity or regard to the season of the year; sometimes it does not dry up for years together. Carinthia is much more abundant in mineral waters than Carniola, but there are none that enjoy any remarkable celebrity. The climate of course varies in different parts. The lofty mountains covered with snow, which either never melts or only in the height of summer, cause the air to be rather sharp and raw in the circles of Villach and Clagenfurt: the vine does not thrive here. Though there are some persons afflicted with goître, the climate is on the whole healthy. It is much milder in the circles of Laybach, Adelsberg, and Neustadtl, where the vine, chestnut, and maize flourish. The government of Trieste has a hot climate; the vegetation is luxuriant, but there is a deficiency of water. In the western parts on the coast the air is rendered unhealthy by the exhalations from the lagunes.

Illyria abounds in mineral wealth. Besides quicksilver, it has copper of the finest quality; excellent iron, lead, silver, cinnabar, alum, coals, marble, rock-crystal, porphyry, jasper, garnets, &c., &c.

The vegetable products contain many rare Alpine plants, medicinal herbs, and roots; also wheat, rye, barley, oats, maize, buck-wheat, potatoes, pulse, some flax, hemp, and hops, garden vegetables, and fruit. The forests have been much thinned for the use of the iron-works, but there is still an abundance of pine, oak, and other timber. The horned cattle and the horses are in general small. The largest flocks of sheep are in the islands, especially in Veglia, which has likewise many horses. Swine and poultry abound everywhere. Of wild animals there are stags, deer, wild boars, chamois, foxes, &c. Bears and

wolves are rare. The game consists of pheasants, bustards, partridges, snipes, and waterfowl. The tunny, mackerel, and anchovy fisheries on the Adriatic are very important. The most important manufactures are those of various articles in iron and steel. The commerce consists chiefly of the transit trade between Vienna and Trieste.

Ancient Illyria comprehended all the provinces on the east coast of the Adriatic, with the adjacent islands as far as Epirus, and was inhabited by a people called by the general name of the Illyric nations. Illyria also extended into the interior as far as the Ister (Danube) and the Alps which lie between Italy and Germany. Macedonia formed the eastern boundary.

ILSLEY, EAST. [BERKSHIRE.]

IMAUS. [HIMALAYA MOUNTAINS.]

IMBECILITY. [INSANITY.]

IMBROS, now Imbro, an island of the Ægean Sea near the coast of the Thracian Chersonesus, and about 22 miles N.E. of Lemnos. It is of an oval form, and its circumference is about 40 miles. The surface is hilly and well wooded. The valleys produce corn, wine, oil, and cotton. The population consists of about 4000 Greeks, who inhabit four villages, the principal of which has a castle, and is called Imbro.

IMIRETIA. [GEORGIA.]

IMMATERIALISM. [MATERIALISM.]

IMMORTALITY. [MATERIALISM.]

IMOLA. [RAVENNA.]

I'MOLA, INNOCE'NZIO DA, a pupil of Francia, and a distinguished painter, of the early half of the sixteenth century, was born at Imola. His family name was Francucci. In 1517 he produced what is considered his masterpiece. It is a large picture, now in the Academy of Bologna, representing the Archangel Michael vanquishing Satan, St. Peter and St. Benedict at the sides, and above in the clouds the Madonna and Child surrounded by angels. The whole is treated much in the second manner of Raphael. It has been engraved by A. Marchi for the 'Pinacoteca di Bologna.' There is also an excellent work by him in the cathedral of Faenza.

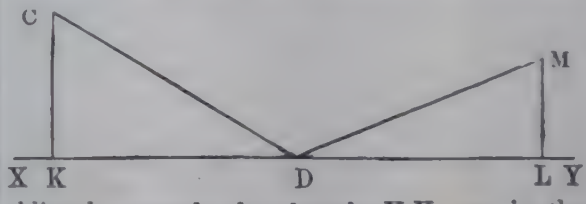
IMPACT (*in* and *pango*), the shock of two bodies, one or both of which are in motion: impact and collision are the technical terms used in mechanics for the meeting of bodies in motion.

It is usual to treat the first principles of this subject by supposing the bodies in question to be spherical; because, if spheres of equal magnitudes be made to strike one another on a plane in the direction of a line joining their centres of gravity, and there be no friction on the plane, a motion of translation simply, without any rotatory motion, will take place. The conclusions deduced from the impact of such spheres, of equal or different weights, will hold good for bodies of any other form, provided there be no rotation, and the line joining their centres of gravity pass through the point of contact.

The consequence of friction taking place between the balls and plane is that the former acquire a rolling motion on the latter; and to this circumstance is owing many of the phenomena observed in games of billiards.

Let us now suppose the ball A to be impelled directly towards an immoveable obstacle, such as an upright ledge at the end of the table. On striking this ledge, the ball will, generally speaking, recoil more or less. Some substances will hardly give any recoil, while others will send the ball back with nearly the same velocity as that of its approach. At the moment of impact, the ball and obstacle compress one another, and the pressure continues until the reaction has destroyed all the velocity of the ball. If then there were no effort in the parts of the obstacle nor in those of the ball to recover their former position, the ball would remain at rest, close to the obstacle. If the recoil were complete, that is, if the parts of both bodies endeavoured to recover their position with a force equal to that which disturbed them, the recoil would rapidly but gradually [IMPULSE] create in the ball a velocity equal to that with which it approached. In the first case the bodies are said to be wholly inelastic, and in the second the elasticity is said to be perfect. But, if only a fraction e of the velocity of approach be restored, then e is said to be the measure of the elasticity of the bodies. Perfect elasticity is usually represented by unity.

Now suppose the ball A (which is so small that its size may be neglected) to approach



obliquely towards the obstacle X Y, say in the direction C D. Let C D be the velocity or length moved over in one second. Then [COMPOSITION; VELOCITY] the velocity C D is equivalent to the two velocities C K and K D. The first is destroyed, and then partially restored by the impact; the second remains unaltered, except by the friction at the moment of impact, which we do not consider. If then we take D L equal to K D, and draw L M perpendicular to X Y, and in length such a fraction of K C as e is of 1, the ball will move, after impact, with the velocities D L and L M, that is, with the velocity D M in the direction D M. If the system were perfectly inelastic, the ball would proceed along D L; if perfectly elastic, M L would be equal to C K, and D M and C D equally inclined to X Y. If the size of the ball be taken into account, X Y must be supposed to be a line parallel to the obstacle, and distant from it by the radius of the ball. On the same principle may the motions resulting from the oblique impact of two elastic balls be determined.

It is proved in all treatises of elementary mechanics that, if two balls designated A and B (which letters represent their weights) move in the same direction with the velocities a and b, A being the hindmost and a the greater velocity, also if e, a proper fraction, represent the elasticity of each ball, we have, after the impact, the velocity of

$$A = \frac{Aa + Bb - eB(a-b}{A+B} = u,$$

and the velocity of

$$B = \frac{Aa + Bb + eA(a-b)}{A+B} = v.$$

Subtracting the former from a, and b from the latter, we obtain the velocity lost by

$$A = (1+e)(a-b)\frac{B}{A+B} = \alpha,$$

and the velocity gained by

$$B = (1+e)(a-b)\frac{A}{A+B} = \beta:$$

hence the momentum lost by A and gained by

$$B = (1+e)(a-b)\frac{AB}{A+B.}$$

Again, by subtraction, $v - u = e(a-b)$.

Lastly, from the above values of u and v we obtain

$$Au^2+Bv^2 = Aa^2+Bb^2-(1-e^2)(a-b)^2\frac{AB}{A+B}$$

$$= Aa^2+Bb^2 - \frac{1-e}{1+e}\{Aa^2+B\beta^2\}.$$

The preceding formulæ will remain true when the bodies are moving in contrary directions, if, the direction of A's motion being called positive, b, or the velocity of B, be made negative. The signs of the formulæ will show in which direction the motion after impact takes place. Making $e = 0$ in the above formulæ, we have the corresponding formulæ for inelastic bodies; and, making $e = 1$, we get the formulæ for bodies whose elasticities are supposed to be perfect, the necessary attention being paid to the signs in all cases. Thus, when the momenta Aa and Bb are equal to one another, two inelastic bodies moving in opposite directions rest after impact; and, when $b = 0$, or B is at rest before impact, the common velocity after impact becomes $\frac{Aa}{A+B}$.

If two perfectly elastic balls be equal in magnitude, the velocity of each after the impact is that which the other had before the impact, both in magnitude and direction.

In all cases perfectly elastic balls recede from each other after impact with the same velocity with which they approached before impact; since, if $e = 1$, $v - u = a - b$. But in every other case the rate of recess after impact is the same proportion of the rate of approach before impact, which e is of 1.

The *vis viva* of a couple of perfectly elastic balls is the same before and after impact; in every other case it is less after impact than before.

In every case of impact, when the balls approach one another with uniform velocities, the centre of gravity of the balls moves uniformly, and in a straight line. After the impact, though the directions and velocities of the balls may have changed, yet their centre of gravity still continues to describe the same line, and with the same velocity as before. This proposition also is proved in all works on elementary mechanics.

IMPA'TIENS, a genus of plants so called from the sudden and elastic force with which they burst their capsules. One of the species is well known as a highly ornamental annual by the name of Balsam, whence the natural family to which it belongs has been called Balsaminæ. The genus is especially an East Indian one, though single species extend into Europe, Siberia, and North America.

IMPEACHMENT. [Parliament.]

IMPENETRABILITY, a name given to the property of matter, the existence of which is suggested when we see that any attempt to place one solid body in the part of space occupied by another is either resisted by the latter, or its success preceded by the removal of the latter. It is then but another name for the cause of that resistance, which we know by the sense of touch, and which is necessary to every idea which we form of matter.

The impenetrability of matter can only be taken in conjunction with the hypothesis of its porosity. Otherwise it might be successfully disputed. Salt may be dissolved in water without increasing the bulk of the fluid; the (impenetrable?) matter is then penetrated, or else the matter of the fluid has interstices. But, if any attempt be made to press the fluid into a smaller space, the impenetrability of the water will appear by its resistance to the pressing substance. The notion of impenetrability is founded on the supposition that, when one body approaches another which is at rest, it must be in contact with it before the latter will move; but many circumstances render it highly probable that actual contact never takes place, and that when the bodies are within a certain small distance from one another repulsive forces begin to be exerted between them: the resistance alluded to is apparently therefore dependent on molecular forces of whose cause and modes of action nothing is known.

IMPERATOR. [Emperor.]

IMPERATO'RIA, a genus of plants belonging to the natural order *Umbelliferæ*. *I. ostruthium* is a native of Europe and Newfoundland in damp meadows and woods. This species is the Masterwort of old English herbalists, and the root has been much celebrated as an antidote against poisons, a diuretic, and sudorific.

IMPERIAL CHAMBER. [Aulic Council.]

IMPETI'GO is a disease of the skin, which Dr. Willan has defined to be 'an eruption of yellow itching pustules, appearing in clusters and terminating in a yellow, thin, scaly crust.' It is commonly known in this country as the humid or running Tetter, and occurs on all parts of the body, though most frequently on the extremities.

IMPORTS and EXPORTS. [Balance of Trade; Demand and Supply.]

IMPOST (*Imposta*, Italian), the horizontal mouldings serving as a sort of cap or cornice to the piers of arches, and on which the archivolts, or curved mouldings and faciæ surrounding the arches themselves, rest. Imposts are contrary to the genius of the Pointed style, but generally essential in Roman and Græco-Roman architecture.

IMPREGNATION (in Vegetable Physiology). Plants, in their more perfect species are furnished with organs, by the mutual action of which they are multiplied, the matter contained in the one fertilising that which belongs to the other, and the result being a young plant, or embryo, or vegetable fœtus. In what way this occurs is still very obscure, although modern observation has thrown much light upon the subject.

In a perfect plant the anther contains a matter called pollen. The pollen is a congeries of excessively small hollow cases, having to the eye the appearance of fine dust. Each case contains a mucilaginous matter, which, at the proper time, is discharged, and falls upon the open orifice of the pistil. This process appears necessary to the formation of the seed, and is called impregnation. [Embryo; Stamen.]

IMPRESSMENT. [Seamen.]

IMPROPRIATION. [Benefice.]

IMPROVVISATORI are extempore versifiers upon any subject. This practice is of frequent occurrence in Italy. The improvvisatore delivers his verse, generally accompanied by a guitar, and with a sort of chanting cadence; and he spins out hundreds, nay, at times thousands of lines, with apparent ease: whole dramas have been thus delivered.

Some improvvisatori have been men of real information and poetical genius, and their compositions are consequently superior to the majority. Gianni, of Genoa, was made improvvisatore to Napoleon's court, and Sgricci of Florence became known throughout Europe by giving specimens of his art in the various capitals. Several ladies have distinguished themselves in the same art; they are styled improvvisatrici.

IMPULSE is that cause by which velocity is suddenly communicated to a body, apparently in an instant and without any perceptible gradations of motion.

Though the term impulse may be of convenient application to cases of motion in which velocities are changed very rapidly, it must be remembered that the idea of absolutely instantaneous change of velocity is in no degree less absurd than that of a point which is in two different positions at the same instant of time. Impulse, then, must be considered as pressure which, beginning from nothing, increases so rapidly with the time as to produce large effects in a small fraction of a second. [Pressure.]

INA, called also INAS, and IN, king of the West Saxons, and one of the kings of the heptarchy, was the son of Cenred, king of Wessex. He succeeded Ceadwalla, but how is not known, in 689, in the lifetime of his father Cenred; for a collection of laws which he published in the fifth year of his reign are stated in the introductory paragraph to have been enacted with the advice of Cenred and other counsellors. These laws of Ina, to quote the summary of Dr. Lingard, 'regulated the administration of justice, fixed the legal compensation for crimes, checked the prevalence of hereditary feuds, placed the conquered Britons under the protection of the state, and exposed and punished the frauds which might be committed in the transfer of merchandise and the cultivation of land.' In 728 Ina resigned his crown, and retired to Rome, where he died before the end of the year.

INARCHING. [Grafting.]

INCA. [Peru.]

INCEST. During the Protectorate, in the year 1650, incest and adultery were made capital offences, but at the Restoration this law was not confirmed. Incest in England is now only punishable by the ecclesiastical courts, according to the rules of the canon law, which also determines what kind of sexual connection is incest. The notion of incest is founded solely upon the degree of consanguinity or affinity between the parties who have had the sexual connection.

INCHBALD, MRS. ELIZABETH, whose maiden name was Simpson, was the daughter of a farmer residing near Bury St. Edmund's. She was born in 1753. Losing her father in youth, she ran away at the age of sixteen to seek her fortune. After several adventures, she obtained a place in a country theatre, and soon married Mr. Inchbald, a respectable actor, much older than herself. Mr. and Mrs. Inchbald performed for four seasons in Edinburgh, and, after an engagement at York, went to France for a time. In 1779 Mr. Inchbald died at Leeds; and in the winter of 1780-81 Mrs. Inchbald began to play secondary parts at Covent-Garden. She continued on the stage till 1789. She had begun to write dramatic pieces several years before her retirement from the stage: the first of these, a slight afterpiece, was acted and printed in 1784; and from that time till 1805 she wrote plays in rapid succession, producing nineteen in all, one of which, 'Lovers' Vows,' is an adaptation from Kotzebue. They gained for her the means not only of supporting herself, but of making a handsome allowance to an invalid sister, and of saving a considerable sum. Her melo-dramatic comedy of 'Such Things Are' gained for her more than four hundred pounds: as much was produced by 'Wives as they Were and Maids as they Are;' and for 'Every One has His Fault,' the most strongly characterised of her plays, she received seven hundred pounds. Mrs. Inchbald's literary talents are best exhibited by her two novels, 'A simple Story,' first published in 1791, and 'Nature and Art,' in 1796. She died on the 1st of August, 1821, at Kensington, leaving nearly 6000*l.* in legacies to her relatives and friends, to the Roman Catholic poor, and to the Covent-Garden Theatrical Fund. She had written an account of her own life, but had refused a thousand pounds for it; and, in obedience to her will, it was destroyed after her death: but her journal, kept regularly for many years, was preserved; and from it and her letters were written Mr. Boaden's 'Memoirs of Mrs. Inchbald,' 1833.

INCIDENCE, ANGLE OF, the angle made by a straight line which passes through any point of a line or surface with the perpendicular to the tangent or tangent plane of that line or surface drawn through the point in question.

INCLINATION. The inclination of two

lines is a phrase commonly used for the angle which they make with one another.

INCLINATION (commonly called the *Dip*) of the Magnetic Needle is the angle which such needle, when supported on its centre of gravity, makes with the plane of the horizon.

The instrument by which this inclination is exhibited is a slender cylindrical or prismatic bar of steel, from six to ten inches long, having, perpendicularly to its length, a short axis of bell-metal usually passing through its centre of gravity, which is the middle point of the bar. The latter, previously to being magnetised, would, of course, if supported on or suspended by its centre of gravity, remain at rest in any position with respect to the horizon; but, on being magnetised, it becomes subject to the magnetic forces in the earth, and its position is then determined by the direction of their resultant. In general the horizontal axis is made to rest on the edges of two plates of agate, and a graduated circle of brass, having its centre coincident with the centre of gravity of the needle, serves to show the amount of the inclination. The plane of the circle is in a vertical position, and when the inclination is to be observed it must be made to coincide with the vertical plane which passes through the line of direction of the said resultant. The angle made with the geographical meridian of the place by this vertical plane, which is that of the needle's motion, is called the *declination* of the needle, or commonly the *variation*.

The discovery of the inclination or dip is ascribed to Robert Norman, who observed that in London (1576) it amounted to nearly 72 degrees. In 1581 he published a work entitled 'New Attractive,' in which he held out a prospect that, by means of a magnetised needle properly mounted, the latitude of a ship at sea might be easily found.

Dr. Gilbert, who in 1600 published his work 'De Magnete,' was the first to assert that the earth possessed a magnetic property; he supposed however that this property existed only in the terrestrial particles. Dr. Halley, in order to account for the changes observed in the direction of the needle, imagined that the earth is hollow, and that it incloses a magnetic nucleus which revolves on an axis distinct from that of the earth's diurnal revolution.

From the observations of La Caille, La Peyrouse, and Humboldt, it seemed that the series of places on the surface of the earth where the magnetic needle rested in a position parallel to the horizon were situated on a great circle of the sphere inclined to the geographical equator in an angle of about 12 degrees; this was therefore denominated the magnetic equator. The points where the axis of this equator would meet the surface of the earth were, of course, considered as the magnetic poles; but it has since been ascertained that the magnetic equator is a curve of double curvature, and crosses the geographical equator in three or four places.

In two voyages made by Captain (now Lieut.-Colonel) Sabine, in 1822 and 1823, one towards the equator, and the other towards the north pole, that officer found that at the island of St. Thomas, near the equator, the inclination of the needle was 0° 4′ towards the south; the inclination was towards the north as the ship returned to Europe; at London it was found to be 70° 3′ north; and at Spitzbergen, the most northern station, it was 81° 11′ north. From the observations of Sir Frederic Parry, one of the magnetic poles of the earth appears to be situated in about lat. 70° N., long. 100° W.

The following are the rules given for observing the inclination, or dip of the needle ('Magnetical Instructions,' &c., by Lieut. Riddle, F.R.S., 1844). The plane of the dip circle must be made to coincide with the magnetic meridian by means of a needle traversing horizontally, and the dip needle, being magnetised, must be made to rest by its axle on the agate planes; then, when the needle is at rest, the graduations on the circle are read at both extremities. The instrument must next be turned 180° in azimuth, and the like readings made. The axle of the needle must afterwards be reversed, and similar readings made with the whole instrument in direct and reversed positions. Lastly, the needle should be re-magnetised so as to reverse its poles, and a second series of readings made with the face of the instrument, and also the face of the needle, in direct and reversed positions. There will thus be obtained eight readings, of which a mean will give the required dip or inclination.

The true inclination (d) may also be obtained from two observed inclinations (δ) and (δ') with the plane of the dip circle in any two positions at right angles to one another, by means of the formula

$$\cot.^2 d = \cot.^2 \delta + \cot.^2 \delta'.$$

The reversion of the poles, which is employed in order to eliminate any error which may arise from a want of coincidence in the needle's centre of gravity and centre of motion, may be avoided by having a short wire, with a brass ball at one end, screwed into the needle immediately above or below the horizontal axis: the true dip (d) may then be obtained, from the dips observed with the ball in the two positions, by the formula

$$\cot. d = \tfrac{1}{2} (\cot. \delta + \cot. \delta'),$$

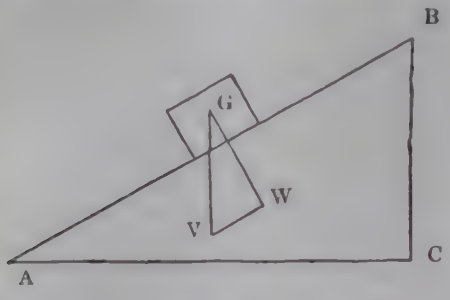
δ and δ' being the observed dips or inclinations.

The mean dip of the magnetic needle at Greenwich was—

For the year 1844, 69° 0.3′
" 1845, 68° 57.45′
" 1846, 68° 58.3′

INCLINED PLANE, a plane surface making any angle with the horizon. A body placed on it is capable of being moved upwards along it with more facility than it can be raised in a vertical direction. The principle on which it constitutes a mechanical power was first introduced by Stevinus in the sixteenth century, and may be explained as follows:—Let AB represent a section of the plane, and G a section of the weight. Let GV represent the magnitude and direction of the weight, and draw GW and WV perpendicular and parallel to AB. Then [COMPOSITION] the pressure GV is equivalent to the two pressures GW and WV, of which the former is destroyed by the resistance of the plane, and the latter only acts to

prop el the heavy body down the plane. Now VW is to VG as BC is to AB; that is, a weight



placed upon an inclined plane is propelled down the plane by such a fraction of the whole pressure of the weight as the height of any section of the plane is of its length.

If, then, it were required to draw the heavy body G up the plane, any pressure exceeding VW would be sufficient for the purpose; and a pressure equal to VW, applied in the direction AB, would keep the weight at rest.

If a body be allowed to descend by gravity on an inclined plane, the force of descent is, to the force downward in a vertical direction, as WV to GV, or as AB to BC; that is, if θ be inclination BAC, and g represent the force of gravity vertically, as $g \sin \theta$ to g. Hence, if v represent the velocity on the plane and s the space descended from a state of rest in the time t, we have $v = g \sin. \theta. t$, $s = \frac{1}{2} g \sin. \theta. t^2$, and $v^2 = 2g \sin. \theta. s$. [Accelerated Motion.]

From these formulæ it may be shown that the velocity acquired by a body in descending from the top to the foot of a plane, whatever be its inclination, is the same as in falling vertically from the top to a horizontal plane passing through the foot.

If k be a fraction representing a portion of a weight W, to which the friction is equivalent; then, W cos θ (represented by GW) being the pressure of W on the plane, k W cos θ will represent the resistance caused by friction on the plane; and, if this be less than W sin θ, the impelling force on the plane, the weight will move downwards with an accelerating force g (sin $\theta - k$ cos θ).

There are many remarkable properties connected with the motion or equilibrium of bodies on inclined planes; but the preceding are those which are most fundamental and most frequently required.

INCLOSURE. The term Inclosure is applied to the inclosing and partitioning of lands in England and Wales, which are comprehended under the general name of Commons or Common Lands. It is necessary to define the terms Commons, and Commonable and Intermixed Lands. Commons or Common Lands are lands in a state of nature or waste, of which individuals have not the severalty. Commonable Lands are those lands which during a part of the year are in severalty, that is, occupied severally by individuals as their own, to the exclusion for the time of other people. The amount of common land in England is not known, but it is conjectured that it may be about 8,000,000 of acres: the total area of England and Wales is supposed to be about 37,000,000 acres.

The amount of commonable and intermixed lands is not known. The nature of these commonable and intermixed lands may be collected from the following instances. 'There are many parishes in the kingdom that consist altogether of intermixed or commonable lands; there are others in which there is a great intermixture of common land with the commonable and intermixed land. The township of Barmby on the Marsh in Yorkshire contains 1692 acres. There are 1152 pieces of open land, which contain 1015 acres, giving an average size of 3 roods 23 perches, and there are 352 old inclosures containing 677 acres. In the parish of Cholsey in Berkshire, the total contents of which are 2381 acres, there are 2315 pieces of open land, which contain 2327 acres, giving an average size of one acre.' This open land generally consists of long strips, too narrow to be ploughed across. Yet much of this land is the best in the kingdom for natural fertility, and is the oldest cultivated land.

Common Rights, that is, rights of pasture and so forth on commons or waste lands, are described generally under Common, Rights of. Common pasture lands require an improved management. It is stated that commons are generally overstocked, partly in consequence of persons turning out more stock than they have a right to do, and partly by persons putting their stock on the common who have no right.

Inclosures of land have now been going on for many years. It is stated that since 1800 about 2000 inclosure acts have passed; and prior to that time about 1600 or 1700. It seems doubtful from the evidence whether the 1600 or 1700 comprehend all inclosure acts passed before 1800. These inclosure acts (with certain exceptions) are private acts, and the expense of obtaining them and the trouble attendant on the carrying their provisions into effect have often prevented the inclosure of commons.

In 1836 an act (6 & 7 Wm. IV. c. 115) was passed for facilitating the inclosure of open and arable fields in England and Wales. In pursuance of the recommendation of a Committee of the House of Commons, which sat in 1844, an act of parliament was passed in 1845 (8 & 9 Vict. c. 118), the object of which is thus stated in the preamble:—'Whereas it is expedient to facilitate the inclosure and improvement of commons and other lands now subject to the rights of property which obstruct cultivation and the productive employment of labour, and to facilitate such exchanges of lands, and such divisions of lands intermixed or divided into inconvenient parcels, as may be beneficial to the respective owners; and it is also expedient to provide remedies for the defective or incomplete execution, and for the non-execution of powers created by general and local acts of inclosure, and to authorise the renewal of such powers in certain cases,' &c.

(*Report from the Select Committee on Commons Inclosure, together with the Minutes of Evidence and Index.* The Report is accompanied with maps which explain various parts of the evidence.

INCOMMENSURABLES, THEORY OF. The application of arithmetic to any science of concrete magnitude supposes a certain magnitude to be taken as unity, and all other magnitudes to be expressed by the number of times or parts of times which they contain this unit. Such an application therefore requires the assumption of this proposition, that all magnitudes are either fractions or multiples, or compounded of fractions and multiples, of any magnitude that may be named. This proposition is not true; for instance, if the sides of a square be called 1, no number nor fraction whatsoever will exactly represent the diagonal. But it may be made as nearly true as we please: for instance, we may find a line as nearly equal to the diagonal as we please, which shall be a definite arithmetical fraction of the side. Quantities which are so related that, when one is capable of being represented in terms of a certain unit the other is not, are called *incommensurables*. The reason is as follows:—any two magnitudes which have a common measure can be arithmetically represented by the same unit: for, if A and B have the common measure M, and if this measure be contained 7 times in A and 10 times in B, then it is evident that, by taking M as the unit, A is represented by 7, and B by 10. If, then, there be two magnitudes which cannot be represented by means of the same unit, they cannot have any common measure, and are therefore *incommensurable*.

The difficulty thus inherent in the application of arithmetic to concrete magnitude is not met with in practice, because no case can arise in which it is necessary to retain a magnitude so closely that no alteration, however small, can be permitted. But in exact reasoning, where any error, however small, is to be avoided, it is obvious that the arithmetic of commensurable magnitudes, and the arithmetic (if there be such a thing) of incommensurable magnitudes, must not be confounded. The difficulty was overcome by Euclid, in his doctrine of proportion, so completely and effectually, that nothing has been added to his solution of it except unsuccessful attempts to evade it. Those who avoid the fifth book of Euclid generally substitute either the tacit assumption that all magnitudes are commensurable, which is not true, or some metaphysical play upon words, which a person who feels the rigour of Euclid places on the same shelf with nature's horror of a vacuum, and other explanations of the same kind. We could even point out a celebrated work on geometry which expressly rests on being able to make its errors too small to be perceived by the senses, and asks for no other reception of propositions which involve incommensurables.

INCREMENT and DECREMENT. When two quantities are considered together, one of which is greater or less than the second, the latter is said to be the former with an increment or decrement. In the older English writings the calculus of differences is called the method of increments.

INCUMBENT. [BENEFICE.]

INDEFINITE means 'not given or defined in magnitude.' Thus a definite straight line is that of which the extremities are known; an indefinite straight line is one of which the direction is given, and which may be supposed to have any length, or which can be lengthened, if necessary, without contravening any of the conditions of the problem. Thus Euclid, in the first book, constructs an equilateral triangle upon a definite straight line, and shows how to draw two lines making with one another the same angle as that made by two given definite straight lines.

There is however a reprehensible use of the word indefinite which is found in many mathematical works; namely, the employment of it to avoid the odium which attaches to the word infinite. Thus we hear of making a magnitude indefinitely great, of an indefinitely small arc being equal to its chord, of the circle being a polygon of an indefinitely great number of sides. In all cases it would be better, with a proper definition, to use the word infinite at once.

A want of proper distinction between definite and indefinite sometimes leads to confusion. For instance, it is said that, if a straight line be halved, if its half be then halved, and if fresh portions be continually taken, each of which is the half of the preceding, the result will at last become less than 'any line which can be named.' This is not true if the line which is to be named be indefinite; that is, if we may at any part of the process make it as small as we please: for it is obvious that, whatever a line may be, a smaller line can be named. But it is true of a definite line, made definite, or given in length, at the beginning of the process. Name any line, however small, but such as you name it let it remain; then by continually halving any other line, however great, you must at last arrive at a line which is less than the length you named. The phraseology of a line 'less than any line which can be named' has often caused a difficulty by not specifying the time at which it is to be named. The language used by Euclid himself is as follows (book x. prop. 1), and is free from the ambiguity in question: 'Two unequal magnitudes being given, if from the greater be taken away its half, and from what is left its half, and if this be done continually, a magnitude will at last be found which is less than the lesser of the two given magnitudes.'

INDENTURE. [DEED.]

INDEPENDENTS, the name of a denomination of English Protestant Dissenters. They are distinguished from Presbyterians and Baptists by being opposed to any union or government of the Church, and by regarding each congregation of faithful men as independent of every other, and competent to its own government without any interference from presbyteries, bishops, or from the state itself. This is the pure principle of English Independency.

Robert Brown, a clergyman of the reign of Elizabeth, is generally reputed to be the first person in England who acted upon these opinions. After he had given no small trouble to the authorities in the Church, he was presented to the living of Achurch in Northamptonshire. A full account

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his person will be found in the 'Biographia Britannica.' He closed a long and very troubled life in the gaol of Northampton, or very soon after he had left it, in 1630.

During the Commonwealth, the Independents were active in preventing the establishment of a Presbyterian church in England. Among the Independent sect was Cromwell. In 1662 the Act of Uniformity was passed, the object of which was to exclude from the ministerial office in the Church of England divines of either of those opinions. The effect of it was, that about 1900 ministers retired from the places they held in the Church. Some make them 2000. The Revolution of 1688 freed the Dissenters from the penalties in the way of fine and imprisonment which were imposed upon them during the reign of Charles II., one of the first acts of the new government being to grant toleration to them, that is, to allow them to open chapels, and to conduct the services under the protection of law.

The 'Act of Toleration' was passed in 1689, and for the seventy years succeeding that date the Independent denomination (as indeed was the case with the whole body of Dissenters) decreased, and it would probably by this time have become extinct, but for the extraordinary revival of religious zeal, created especially by the Wesleys and Whitefield. Under this influence a large number of persons were led to join themselves to one of the three Methodist bodies; the Wesleyan Methodists, the Whitefieldian Methodists, or the Countess of Huntingdon's Connection; but there were many who declined to unite themselves with any of these, and formed themselves into separate churches upon Independent principles.

The Independents have numerous chapels in London and in various parts of the country, with many very popular ministers. They have also several institutions for the education of their ministers.

INDETERMINATE, a word which is mostly applied in mathematics, not to the character of a magnitude, but of a problem. A question is said to be indeterminate when it admits of an infinite number of solutions: if the number of solutions, few or many, be finite, the problem is sometimes, but we believe not most frequently, called indeterminate.

INDIA. [HINDUSTAN.]

INDIAN RUBBER. [CAOUTCHOUC.]

INDIA'NA, one of the United States of North America, is bounded S.E. by the river Ohio, which divides it from Kentucky, E. by the state of Ohio, N. by Michigan, and W. by the state of Illinois. It lies between 37° 45′ and 41° 52′ N. lat., and between 84° 42′ and 87° 49′ W. long. The mean length is 260 miles, and the mean breadth 140 miles. The area is 36,000 square miles. The population in 1840 was 685,866, none of whom were slaves.

The Ohio and the Wabash are the most important rivers. [OHIO.] The Wabash rises in Ohio, and flows thence into this state. Its whole course through Indiana, and along its western boundary, is between 500 and 600 miles, all navigable except at its falls or rapids. All the other principal rivers of the state are tributaries of the Wabash: the White River is formed of two main branches, of which the northern has a S.W. course of about 300 miles, and the East Fork has also a general S.W. course of 200 miles. The Wabash also receives the Tippecanoe and the Eel River from the N.E., then the Missisinewa from the S.E., and Little River from the N.E. Many streams fall into the Ohio, but none of much magnitude. The same remark applies to those which flow into Lake Michigan.

This state, like Illinois, has a general slope to the S.W. Like that state also, it is, with few exceptions, one great plain. There is indeed a tract of hilly country north of the great bend of the Wabash, and the state is skirted on the south by those eminences called the Ohio Hills, which sometimes touch the Ohio and sometimes retire from it for two or three miles; they occasionally rise 300 feet above the river. The timbered and prairie lands are more intermixed in this state than is usual; and the alluvial river-bottoms are all wide. The soil is admirably suited for grass and grain. The climate is somewhat more equable than that of Illinois, and milder than that of western Pennsylvania. It is everywhere healthy except in the neighbourhood of the wet prairies and swamps. Iron, copper, coal, and salt have been found, but little of any of them has yet been wrought.

The agricultural products of the state are wheat, maize, tobacco, and a little cotton; swine and cattle are also reared. The most successful vineyards in the United States are at Vevay on the Ohio. They are managed by the Swiss settlers at that place, and consist of native species of the vine.

The Wabash and Erie Canal extends from Lafayette on the Wabash, 187 miles, to Toledo, on the Maumee Bay, 100 miles being in Indiana and 87 miles in Ohio. The White Water Canal extends from Lawrencebury 30 miles to Brookville. The Central Canal, parts of which have been completed, is designed to be 290 miles long. The Madison and Indianopolis Railroad extends from Madison on the Ohio 95 miles to Indianopolis.

Indiana is divided into 87 counties. The following are the principal towns, with the population of each in 1840:—*Indianopolis*, the capital of Indiana, is situated near the centre of the state, on the east bank of White River, which is navigable thus far at high water. It contains a state-house, governor's house, and court-house. Population, 2692. *La Fayette* is 70 miles N.W. from Indianopolis. Population about 2000. *Madison*, on the north bank of the Ohio, 85 miles S.E. from Indianopolis, has an active trade. Population, 2798. *New Albany*, on the north bank of the Ohio, 121 miles S. by E. from Indianopolis, has a court-house, gaol, and 9 places of public worship. Population, 4226. *Terre Haute* is situated on the east bank of the Wabash. Population, 2500. *Vevay*, 94 miles S.E. from Indianopolis, on the northern bank of the Ohio, was settled by emigrants from Switzerland. Population, about 1200. *Vincennes*, on the

bank of the Wabash, 118 miles from Indianopolis, was settled by the French, and is the oldest town in the state. Population, about 2000.

Madison University, at South Hanover, 93 miles S.E. from Indianopolis, is the chief educational establishment of the state. The Baptists are the most numerous sect, and next to them the Presbyterians and Methodists. The legislative body consists of 50 senators and 100 representatives. The state sends 2 senators and 10 representatives to congress.

Indiana was included in the cession of Virginia to the United States in 1787. It was placed under a territorial government with Illinois in 1800, and under a separate government in 1809. In 1816 it became a state, and formed its present constitution.

INDICATORI'NÆ, Mr. Swainson's name for the Honey Guides, a subfamily of cuckoos (*Cuculidæ*).

There appears to be but one genus, *Indicator* (De Vaillant), which is thus characterised :—Bill straight, finch-like; the base triangular; the sides compressed. Culmen and gonys equally inclined towards the tip; gonys angulated. Wings lengthened, pointed. Tail moderate, rounded. Feet short. Middle toe much longer than the tarsus. Locality, Africa.

The species are not numerous. The stories told of these birds indicating the nest of bees and guiding men to them by their motions and cries, from the time of Sparrman downwards, appear to be perfectly authentic, though some great travellers affected to disbelieve them.

Mr. Steadman, in his 'Wanderings and Adventures in South Africa' (1835), says, 'The little honey-sucker, or Indicator, kept fluttering before us with its cry of *cherr, cherr*, as if inviting us to follow. It is frequently known to conduct travellers to a nest of honey deposited in the hollow of a tree. I have however heard many instances mentioned of its stopping short of the hive, and hovering over a spot where a lion or tiger has been reposing, justly establishing its character as an indicator.' [CUCULIDÆ; CUCULINÆ.]

INDICTION. [CHRONOLOGY.]

INDICTMENT is a written accusation of one or more persons of a crime or misdemeanour preferred to and presented by a grand jury. The decision of the grand jury is not a verdict upon the guilt of the accused, but merely the expression of their opinion that the matter is fit to be presented to the common jury, and in conducting the inquiry the evidence in support of the accusation only is heard. If the grand jury think the accusation groundless, they indorse upon the bill 'not a true bill,' or 'not found;' if the contrary, 'a true bill;' and in finding a true bill twelve at least of the grand jury must concur. When a bill is found to be a true bill, the trial of the accused takes place in the usual form; and when the bill is found not to be true, or, as it is frequently called, 'ignored,' the accused is discharged, but a new bill may be preferred against him before the same or another grand jury.

INDIGO, a well-known and beautiful blue vegetable colour, which is extensively employed in dyeing and calico printing. The plants from which it is mostly obtained belong to the genus INDIGOFERA.

When the plant is in full flower, it contains most colouring matter. It is then cut, and put into vats, and covered with water; fermentation takes place, accompanied with the evolution of carbonic acid and probably other gaseous products, and the yellow liquor is covered with a froth which in a little time becomes of a violet colour, and a substance is dissolved which is rendered blue by absorbing the oxygen of the air, and being then rendered insoluble it is precipitated; and this, when collected and dried, is indigo.

The usual appearance of indigo as it occurs in commerce is that of nearly cubical cakes of an intense blue colour and earthy fracture. Indigo seldom contains more than about half its weight of pure colouring matter, and frequently much less.

When common indigo has been treated with dilute acids, alkalis, and alcohol, the remainder is *indigotin*, or indigo, nearly in a state of purity. It is composed of hydrogen, 3.93; carbon, 72.34; oxygen, 12.60; nitrogen, 11.13.

The quantity of indigo consumed in Great Britain and Ireland amounts to about 2,500,000lbs. annually.

INDIGO'FERA, a genus of plants of the natural family of *Leguminosæ*, indigenous in the equinoctial parts of Asia, Africa, and America, and celebrated for some of the species yielding indigo. The species are about 150 in number. *I. tinctoria* is the species generally cultivated in India, whence it has been introduced both into Africa and America. *I. Anil* is said by De Candolle to grow wild in America, and to be cultivated in both Indies, as also along the Gambia in Africa. *I. cærulea* is a new Indian species described by Dr. Roxburgh, who states that from the leaves he had often extracted a most beautiful light indigo, more so than he ever could from the common indigo plant. It flowers during the wet and cold seasons. *I. argentea* is the species cultivated in Egypt and Barbary for the sake of its indigo, and, according to Humboldt, also in America. *I. disperma*, according to Humboldt, is also one of the species cultivated in America, and seen among the most ancient hieroglyphical paintings of the Mexicans. Dr. Bancroft considers it as the species called Guatemala indigo, which yields fine pulp, but is less productive than other species.

Plants of other genera are also employed for obtaining indigo; as *Wrightia tinctoria*, *Marsdenia tinctoria*, *Galega tinctoria*, but especially the two first. Dr. Bancroft also adduces *Spilanthes tinctoria*, *Scabiosa succisa*, *Cheiranthus fenestralis*, and several others, as all yielding a blue dye, or coarse sort of indigo.

INDORE, a city of Hindustan, in the province of Malwa, and the capital of the dominions of Holkar. Indore is in 22° 42′ N. lat., and 75° 50′ E. long. It is a modern city, the old city on the same site having been wholly destroyed by fire by Sindia, in 1801, during the war between that chief and Holkar. The extension of the city since 1818 has been extremely rapid, and its

population is now about 60,000. The streets are spacious and paved; a great proportion of the houses are of two stories, and built of masonry, but there are many mud dwellings interspersed. The raja's palace, which was begun in 1819, is a large quadrangular granite building.

INDRE, a department in France formed out of the western portion of the old province of Berri, is bounded N. by the department of Loir-et-Cher, E. by that of Cher, S. by those of Creuse and Haute-Vienne, and W. by those of Vienne and Indre-et-Loire. It lies between 46° 21′ and 47° 16′ N. lat., 0° 53′ and 2° 12′ E. long., and measures 64 miles in its greatest length, with a mean breadth of 54 miles. The area is 2660 square miles, and the population in 1846 was 263,977; which gives 99.24 to the square mile, being 74.51 below the average per square mile for all France.

The department is in general very flat; the only hills of any considerable size are the granitic swells on the southern border, and the gentle slopes that diversify the valleys of the Creuse and the Indre. The surface presents three marked and distinct divisions. The first called *Bois-Chaud* comprises 7-tenths of the whole department, including the arrondissements of La-Châtre, a great portion of those of Châteauroux and Le-Blanc, and a third of that of Issoudun; it is divided, where arable, into a great number of small farms, and presents a very varied appearance, from the number of its hedges, ditches, and woods. The second division, distinguished by the name of *Champagne*, is a flat treeless country, without hedge or inclosure of any kind, divided into large farms, and comprising 2-thirds of the arrondissement of Issoudun and a part of that of Châteauroux. The third division, called *La Brenne*, comprises parts of the arrondissements of Châteauroux and Le-Blanc, and presents a flat surface, without inclination, and covered with shallow ponds, which rest on a bottom of compact clay, and which, by their pestilential exhalations, are very injurious to health. The land varies greatly in quality, from light moss or barren sand to stiff clay, and from the vegetable mould, half covered with flints, to the rich homogeneous soil called *terre de Beauce*, which is considered the most productive, and covers 194,790 acres. The flinty soils, amounting to 111,626 acres, are best adapted for vine culture. All the land capable of cultivation is tilled, but agriculture is in a backward state.

The department takes its name from the river *Indre*, which rises just within the department of Creuse, and entering that of Indre flows N.W. past Sainte-Sévère, La-Châtre, Châteauroux, and Châtillon, below which it enters the department of Indre-et-Loire; here passing Loches, where it becomes navigable, it continues in the same direction as far as Montbazon, and then turning W. passes Azay-le-Rideau, below which it enters the Loire between the embouchures of the Creuse and the Vienne. Its whole length is 124 miles, of which 44 are navigable; its mean width is 98 feet, and its ordinary depth from 5 to 6 feet. It is subject to floods, which rise from 10 to 11 feet at most, and spreading beyond the banks sometimes do great damage, but add greatly to the fertility of the soil. The number of mills along the banks of this river is very great. The south and south-west of the department is drained by the Creuse and its feeder, the Anglin, which is itself increased by the Abloux. [CREUSE.] The west of the department is drained by the *Claise*, a feeder of the Creuse, which flows through the marshy district of Brenne; and the east and north are drained by feeders of the Cher, namely, the *Aron*, which receives the Théols, and the *Fouzon*, fed by the Nahon.

The department is crossed by a railroad, which branches off from the Orléans-Bourges Line at Vierzon, and runs through Issoudun to Châteauroux. It is traversed also by 6 royal, 16 departmental, and 31 parish roads.

The department contains 1,702,248 acres, distributed among 86,977 proprietors, and into 1,050,523 parcels. Of this surface 992,215 acres are under tillage; 210,796 consist of natural pasture; 44,752 acres are under vine culture; 166,609 are covered with woods and forests; 185,368 acres consist of sands, heaths, and barren moors; 18,274 acres are occupied as orchards, nurseries, gardens, and plantations of different sorts; and 31,055 acres are covered with ponds, rivers, canals, &c. The common breadstuffs are produced in quantity more than enough for the consumption; buck-wheat, hemp, flax, chestnuts, and fruits are also grown. The annual produce of wine is 6,600,000 gallons, about one-half of which is exported. Although the pasture land is of no great extent, yet considerable numbers of horned cattle are kept; hay is saved for their winter food, and in summer the scantiness of the pasture is eked out with the leaves of trees, especially with those of the elm. Sheep are a source of great profit to the farmer, on account of the fineness of their wool; the quality of the wool of the *Champagne* district especially is very superior. The sheep are very carefully tended; ewes, lambhogs, and wethers, are kept in separate flocks, each under its own shepherd: they are never folded; when the winter is severe, they get a mixture of hay and straw three times a day. Great numbers of geese and turkeys are reared, and also of mules, pigs, and horses. The climate is mild and healthy, except in the Brenne district, where the atmosphere is almost always charged with pestilential fogs.

Several iron mines are worked; marble, millstone, limestone, mica, flint, lithographic stones, granite, quartz, spar, marl, potter's clay, variegated marbles, &c., are found.

The cloth manufactures of Châteauroux and some other places are important; linen, hosiery, scythes, paper, porcelain, and earthenware are made. There are also numerous establishments for the manufacture of woollen yarn, leather, beer, parchment, &c. The number of iron forges and foundries is 17; of wind and water mills 573; and of factories of different kinds, 217. The most important iron-works are those of Clavières. The commerce of the department is composed of the various agricultural and industrial products named. About 340 fairs are held in the year, principally for the sale of sheep.

The department is divided into 4 arrondissements, which, with their subdivisions and population, are as follows :—

Arronds.	Cantons.	Communes.	Pop. in 1836.
Châteauroux .	8		98,743
Le-Blanc . .	6	64	59,771
Issoudun . .	4	53	49,168
La-Châtre . .	5		56,295
Total . .	23	276	263,977

Of the arrondissement of Châteauroux and of the whole department, the capital is CHATEAUROUX. *Argenton-sur-Creuse*, 16 miles S. by W. from Châteauroux, is built on both banks of the Creuse, and consists of an upper town which grew up round an ancient castle now in ruins, and of a lower town joined to the former by a stone bridge. The most remarkable structures now remaining in the upper town, which is entered by 4 gates, are the Gate of Auditory, now used as a prison, and the desecrated church of St.-Benoît, now used as the corn market, on the roof of which are still seen the arms of Louis de Bourbon, count of Vendôme. Linen, cloth, tiles, bricks, woollen yarn, paper, leather, &c., are manufactured in the town, which has 4346 inhabitants. *Ardentes-St.-Vinent*, on the right bank of the Indre, has 2162 inhabitants. *Bourg-Dieu* or *Déols*, formerly a large town, and the capital of lower Berri, now a village of 2344 inhabitants, stands about a mile N. of Châteauroux. It was celebrated for its Benedictine Abbey, the suppression of which by Gregory XV. in 1623, caused the decay of the town. Of the vast buildings of the abbey, only a single tower is now standing; the magnificent ruins which remained till 1830 were then sold and removed as materials for building. *Buzançais*, prettily situated 13 miles W. of Châteauroux on a hill on the right bank of the river Indre, which is here crossed by five bridges, is an ill-built town with 4430 inhabitants, who manufacture coarse woollens and woollen yarn. There are several flour mills in the town, and in the environs there are large iron works. *Châtillon-sur-Indre*, formerly an important fortress on the frontiers of Berry, is built on a height crowned by the ruins of an ancient castle, near the left bank of the Indre, 26 miles N.W. from Châteauroux, and has 3575 inhabitants. The church is a large and handsome structure, which dates from the 10th century, and contains some remarkable sculptures. In the principal street there is an ancient house, on the front of which are figures of Momus and a player on the pipe. From the market place there is a fine view of the valley of the Indre. *Levroux*, the ancient *Gabatum*, stands on the Nahon, 12 miles N. from Châteauroux, and has 3166 inhabitants, who manufacture cloth and leather, and deal in corn, wine, wool, and cattle. The parish church of Levroux is considered the finest in all Lower Berry. Several Roman remains and Celtic coins have been found in and near this town, some of the fortifications of which still remain. *Valençay*, farther N. on the left bank of the Nahon, has a population of 3229, and manufactures of hosiery, cloth, cutlery, and fine woollen yarn. The great ornament of Valençay is the magnificent château or rather palace built in the reign of François I., by the family of Etampes; it is surrounded by a large park, in which there are beautiful gardens and waterworks. This château was the prison of Ferdinand VII., king of Spain, from 1808 to 1814; it was the property of Talleyrand, who for some time made it his residence.

In the arrondissement of Le-Blanc, the chief town, *Le-Blanc*, is beautifully situated on the Creuse, here crossed by a handsome bridge, above which the river expands so as to form a lake, and below it breaks into cascades, generating force to drive the machinery of several factories. The town is not well built, but it is improving, and has considerable cloth factories, vinegar works, potteries, a linen-yarn mill with 3600 spindles, a large brewery, and several iron forges and smelting furnaces. It is the seat of a tribunal of first instance, and has a savings' bank, and 5290 inhabitants, who trade in wine, fish, timber staves, and the articles named before. *Bélâbre*, S. by E. of Le-Blanc, on the right bank of the Anglin, has 2175 inhabitants, and some remains of an ancient castle. *Mezières-en-Brenne*, under 2000 inhabitants, stands N. by E. of Le-Blanc, on the right bank of the Claise, in a district not long ago an unapproachable marsh, but now drained, planted, and well cultivated. There is a remarkable church here, which was dedicated in 1339 to Sainte-Marie-Madeleine, and contains many mementoes of the family of Anjou. *St.-Gaultier*, E. of Le-Blanc, on the Creuse, which is here passed on a suspension bridge, has an ecclesiastical college, and a population of 1793.

In the arrondissement of Issoudun, the chief town, *Issoudun*, is situated partly on the slope, and partly at the foot of a hill above the river Théols, which is here crossed by three bridges, leading to as many suburbs, in 46° 56′ 54″ N. lat., 2° 0′ 49′ E. long., at a distance of 17 miles by railway N.E. from Châteauroux, and has 12,234 inhabitants. The older part of the town, called Le Château, has very good houses, but the streets are dirty, narrow, and tortuous; the rest of the town is better built, having been constructed since the terrible conflagration of 1651, which broke out at a time when the city was assaulted by the army of the Fronde, and by which 12,000 houses were destroyed. The principal buildings are the residences of the prefect and the mayor; opposite the latter, in a picturesque garden, stands an ancient tower of great strength, called La Tour-Blanche, the walls of which are 14 feet thick, and rise to the height of 95 feet. Other remarkable objects are—the former town-gate and tower, now used as a prison; the hospital, in the chapel of which are some curious sculptured monuments; the former Ursuline convent, now a barrack; the former Carmelite convent, now a private residence, the theatre, and the several public walks. The town has tribunals of first instance and of commerce; a consultative chamber of manufactures, and a college. Woollen cloth and yarn, calico, hosiery,

parchment, leather, and beer are the principal industrial products; there are some bleaching establishments also, and a good business is done in the articles enumerated, and in corn, wine, wool, cattle, wood, timber, iron of superior quality, &c. *Vatan*, which stands 13 miles N.W. of Issoudun, has an ancient church dedicated to St.-Laurian, and rebuilt in 1005: population 2978. *Reuilly*, 9 miles N. by railway from Issoudun, stands near the Théols and has 2241 inhabitants. In the town there is a remarkable structure in the Renaissance style, which is called La Grande-Maison; and in the environs is the splendid residence of Ferté-Reuilly, built by Mansard in 1659 for Jacques de la Fond. An ancient Gothic church stands half a mile S. of the town, on the hill of Vergy, the summit of which was formerly crowned by a strong fortress.

In the arrondissement of La-Châtre, the chief town is *La-Châtre*, which stands in the most fertile and picturesque part of Berri, on a hill that skirts the Indre on one side and overlooks on the other a deep narrow valley laid out in gardens and orchards. It is situated in 46° 34′ 53″ N. lat., 1° 59′ 4″ E. long., 19 miles S.E. from Châteauroux, and has a tribunal of first instance, a college, and 4635 inhabitants. The streets are well but not regularly built, yet the town makes an agreeable impression from the charming scenery which is presented to view from almost every point. The most remarkable structures are the church and two ancient wooden houses. Woollen cloth and leather are manufactured; there is also a considerable trade in wool, goat skins, feathers, cattle, and chestnuts (of which large quantities are grown in the neighbourhood). *Aigurande*, S. of La-Châtre, has a population of 2005. *Neuvy-St.-Sépulchre*, said to occupy the site of the ancient *Noviodunum*, is 8 miles W. of La-Châtre, and has a population of 2003. *Sainte-Sévère*, formerly a strong fortress, now a village of about 1000 inhabitants, stands near the Indre, 6 miles S.S.E. from La-Châtre. Of its formidable defences which were with great difficulty mastered by Duguesclin, only a single tower remains.

The department forms, together with that of Cher, the see of the Archbishop of Bourges; it is comprised in the jurisdiction of the Cour Royale and University Academy of Bourges, and belongs to the 15th Military Division, of which Bourges is head-quarters. It returned 4 members to the Chamber of Deputies; it now has 7 Representatives in the National Assembly.

(*Dictionnaire de la France; Statistique de la France;* Richard, *Guide Classique du Voyageur en France: Annuaire pour l'An* 1849.)

INDRE-ET-LOIRE, a department in France, formed out of the old province of Touraine, is bounded N. and N.E. by the departments of Sarthe and Loir-et-Cher, E. and S.E. by those of Loir-et-Cher and Indre, S. by those of Indre and Vienne, and W. by those of Vienne and Maine-et-Loire. It lies between 46° 43′ and 47° 42′ N. lat., 0° 5′ and 1° 18′ E. long.; its greatest length from N. to S. is 68 miles, from E. to W. 55 miles. The area is 2360 square miles, and the population in 1846 was 312,400, which gives 132.37 to the square mile, being 41.38 below the average per square mile for all France.

The department takes its name from the INDRE, noticed in the preceding article, and the LOIRE, which crosses it from E. to W. The other rivers which ultimately or directly enter the Loire on the left bank are the CHER, which throws off several arms to the Loire, forming islands before its main stream enters that river: the Claise, which crosses the southern angle of the department [INDRE]: the CREUSE, which forms part of the south-western boundary: and the VIENNE, which enters this department at the point where it is joined by the Creuse, and, flowing in a north-western course past Chinon, enters the Loire on the extreme western boundary of the department. On the right bank the feeders of the Loire in this department are the Brenne and the Doit. The *Doit* rises in a pond W. of Savigné; flowing S. past Bourgueil, it turns W. and, under the name of *Authion*, runs for the distance of 40 miles parallel to the Loire, which it enters in the centre of the department of Maine-et-Loire at St.-Aubin-des-Ponts-de-Cé, S. of Angers. Except the Brenne, the Doit, and the Claise, all the rivers mentioned are navigable. The department is traversed by 6 royal and 28 departmental roads, and by the Orléans-Tours Railroad, now open to Tours, whence two branches in course of construction run, one S. through Poitiers and Angoulême to Bordeaux, the other W. through Angers to Nantes.

The Loire and its principal feeders are subject to great inundations, which frequently do incalculable damage to property on their banks. The most disastrous overflow of this kind on record occurred in October 1846, when in one night the Loire rose 20 feet, and continued to rise for two days, sweeping away bridges and viaducts, destroying many lives, and property to the amount of about 2,000,000*l.* sterling. On ordinary occasions such disasters are prevented by the enormous dykes that line both banks of this great river from the neighbourhood of Blois to the mouth of the Authion before mentioned, a distance of 93 miles. The dykes are 22 feet wide on the top, and so high as to intercept the view of the low grounds from passengers by the steamers that ply on the river; the parts most exposed to the flood are faced with uncemented masonry. The high road runs along the summit of the dyke on the right bank, and presents one of the finest drives in the world, curtained with poplars and diversified by the views of villas, towns, populous villages, and those curious dwellings hollowed out in the sides of the rocky hills that now and then approach the right shore.

To the north of the Loire the surface of the department is hilly, and presents three extensive forests and several vast barren and arid wastes. The cultivation here is rude in the extreme, and the population scanty. Along the banks of the Loire however a very different aspect presents itself; well-cultivated fields, luxuriant pastures and meadows, vineyards and orchards attesting equally the fertility of the deep alluvial soil and the industry of the inhabitants. Between the Indre and the Vienne there is a remarkable table-land, which contains an immense deposit o

fossil shells. The great forests south of the Loire are those of Amboise, Loches, and Chinon. On the slopes surrounding the forest of Amboise are the vineyards that yield the rich Cher wines. In general the surface in this portion of the department presents strong deep wheat soils, rich pastures, vineyards, and orchards. There are however some barren wastes here as well as north of the Loire, but they are comparatively of small extent. The inundations of the rivers add greatly to the fertility of the soil.

The department contains 1,510,546 acres, distributed among 111,984 proprietors, and into 1,518,107 parcels. Of this surface 827,610 acres are arable land; 329,806 acres consist of grass land; 86,499 acres are under vine culture; 222,402 acres are covered with woods and forests; 155,630 acres consist of heath and moorland; 13,423 acres are under orchards, nurseries, plantations, &c.; 45,075 under various cultivation; 20,424 are covered with rivers and waters; and 50,631 are occupied by roads, streets, buildings, &c. The valleys of the Loire and the other principal rivers in this department contain some of the most fertile and best cultivated land in France. All kinds of breadstuffs are produced in quantity more than enough for the consumption. One of the most important products is wine, of which 13,816,000 gallons are made in ordinary years; next come hemp, walnuts for making oil, plums, beans, leguminous plants, liquorice, anise, and coriander; citrons, melons, almonds, apples, pears, truffles, &c. Bees and silkworms are carefully tended; game and fish are abundant.

Iron mines are worked; stone, especially a tufaceous sandstone, of which most of the houses are built, is quarried out of the hills near the Loire, and excavations thus formed are occupied as dwelling places by the poorer inhabitants. Millstone grit, marl, potter's clay, and brick-earth are found. Copper ore is met with, but no mines are worked.

The chief industrial products are bar iron, powder, and files; woollen cloth, of which manufacture Tours is the centre; silk, leather, paper, and pottery are also made, but the manufacture of these articles is not so important as formerly. The exports consist mostly of agricultural products, the imports of colonial produce, glass, cotton stuffs, fine linen and woollen cloth, furniture, haberdashery, &c. About 90 fairs for the sale of cattle and agricultural produce are held. The department contains 726 wind and water mills, 46 iron forges and smelting furnaces, and 199 factories of different sorts. Druidical or Celtic remains are numerous in this part of France.

The department is divided into 3 arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1846.
Tours . . .	11	119	157,062
Chinon . . .	7	109	91,244
Loches . . .	6	74	64,094
Total. . .	24	302	312,400

In the arrondissement of Tours, the chief town *Tours*, which is also the capital of the department, stands on the left bank of the Loire, in a plain that lies between that river and the Cher, in 47° 23′ 46″ N. lat., 0° 41′ 24″ E. long., 65 miles by railway S.W. from Orléans, and has 28,691 inhabitants. Tours, as well as Touraine, takes its name from the *Turones*, a Celtic tribe, of whose capital *Cæsarodunum* or *Cæsaromagus* it occupies the site. The entrance to the city from the Paris road is striking; a magnificent stone bridge of 15 arches, 475 yards in length, and 16 yards wide, leads across the Loire into a spacious square, formed by the wide river on the northern side, the fine buildings of the town-hall and the museum on the south, while the east and west sides are formed by two terraces planted with trees. Passing through the square, a straight wide street (Rue Royale) is entered, consisting of houses built in good taste and on a uniform plan; this street, which is furnished with foot-pavements, runs right across the town in its widest part, and terminates in the avenue of Grammont, at the end of which a bridge crosses the Cher into the Poitiers road. The other streets are, with few exceptions, ill-built, narrow, and crooked. There are several suburbs, but these can scarcely be distinguished from the town itself, as it has no ramparts except on the side next the Cher, and these are laid out so as to form the fine promenade called Le-Mail. The wide quays along the Loire, which is joined to the Cher by a canal, are a great ornament to the town; they extend on each side of the bridge, are planted with trees, and backed by large buildings. The most remarkable structures in Tours are—the cathedral, dedicated to St.-Gratien, the first bishop of Tours, the portal of which contains a magnificent rose window, and is surmounted by two towers 263 feet in height and terminating in domes; the cavalry barracks, built on the site of the English Henry II.'s castle, of which only a single tower now remains; two lofty towers in the Rue St.-Martin (one containing a clock, and hence called Tour d'Horloge, and the other called La Tour de Charlemagne, from the belief that Charlemagne's queen was buried beneath it), which are the only remains of the great cathedral of St.-Martin-de-Tours; the churches of St. Clément and de-la-Riche; the fountain of Beaune, which stands in the market-place, and consists of an octagonal basin filled with water, gushing in four jets from a central pyramid adorned with sculptures and arabesques; the archiepiscopal palace; the court-house; the college buildings; the general hospital; and the residence of the prefect, which also contains a public library of 40,000 volumes and several valuable manuscripts. Tours has a tribunal of first instance, a tribunal and chamber of commerce, one communal and two ecclesiastical colleges, a botanic garden, and several literary and scientific societies. The chief manufactures are woollen cloth, silk stuffs, ribands, serge, carpets, small wares, wax candles, woollen yarn, leather; the commerce is composed of these articles and of corn, wine, brandy, plums and dried fruit, hemp, wool, &c. Tours had, in the middle ages, one of the most important mints in

France, in which were coined the *livres tournoises*, often named in history, and each worth a franc. In one of the suburbs of Tours, called Riche (2000 inhabitants), stood the castle of *Plessis-les-Tours*, in which Louis XI. died; the keep is the only part of the edifice now standing. The other towns are AMBOISE, the castle of which is now (March 1849) the prison residence of Abd-el-Kader: *Bléré*, a busy little town of 3417 inhabitants, on the left bank of the Cher, which is here crossed by a bridge built by Henry II. of England: *Château-la-Vallière*, in the north-west of the department, which has iron forges and 1370 inhabitants: *Château-Renault*, which stands on the slope and at the foot of a hill in a pretty country on the Brenne, and has 2887 inhabitants, who manufacture cloth, flannel, leather, and tiles; the town is named from an old castle built in the year 981, and still standing: *Montbazon*, a small place on the right bank of the Indre, with a population of only 1181, but important for the great powder-mills and saltpetre-works near it: and *Vouvray*, which is situated 5 miles E. from Tours on the Loire, in a district famous for its white wine, and has 2443 inhabitants.

In the arrondissement of Chinon, the chief town *Chinon* is built on the Vienne, at the foot of a hill, the summit of which is covered with the ruins of the ancient fortress of Chinon, in which Henry II. died, and Joan of Arc had her first interview with Charles VII. It is 28 miles S.W. from Tours, and has a tribunal of first instance, a college, savings' bank, and 6785 inhabitants, who manufacture serge, drugget, haircloth, earthenware, saltpetre, &c., and trade in cattle, corn, wine, brandy, plums, nut-oil, honey, wax, &c. Chinon is an improving town; the old ramparts are now replaced by quays. *Azay-le-Rideau*, prettily situated on the Indre, about 5 miles above its junction with the Loire, is remarkable for a fine structure called Château-d'Azay, built on an island in the Indre; the town has 2105 inhabitants. *Bourgueil*, situated in a very fertile district on the right bank of the Doit, at a distance of 10 miles N. from Chinon, has a college, and 3493 inhabitants. *Cinq-Mars*, on the left bank of the Loire, near Langeais, is a small place of only 1728 inhabitants. It deserves notice on account of its ancient square tower, which is built of bricks, perfectly solid, 90 feet high, 13 feet wide on each face, and surmounted at the angles by four pinnacles, each 11 feet high; a central pinnacle was thrown down by a storm in 1571. The purpose and date of its erection are unknown. *Langeais*, 18 miles N.N.E. from Chinon, stands on the right bank of the Loire, and has 3138 inhabitants, who trade in agricultural produce and manufacture linen, tiles, and bricks. The castle in which Charles VIII. espoused Anne of Britanny is still in tolerable preservation, but has been converted into a stable. *Sainte-Maure* stands on the right bank of the Manse, 18 miles E. from Chinon, and has 2602 inhabitants, who manufacture linen, printed calicoes, and haircloth. The church of Sainte-Maure is one of the finest in Touraine; it dates from the twelfth century, and beneath it there is a crypt still more ancient. *Richelieu*, a well-built town, consisting of several wide straight streets that terminate in a handsome square in the centre of the town, stands 12 miles S. from Chinon on the Mable, and has 2832 inhabitants, who manufacture beet-root sugar and brandy, and have a considerable trade in wine, fruits, and other agricultural produce. Cardinal Richelieu erected a residence here in 1637, and the town was then built on a regular plan; the cardinal's palace is now a heap of ruins.

In the arrondissement of Loches, the chief town *Loches* stands on the left bank of the Indre, at a little distance from *Beaulieu*, a suburb of 2000 inhabitants, to which it is joined by several bridges thrown across the arms of the river. The town is 25 miles S. by E. from Tours; it is built round the base of a hill, the summit of which is crowned by the remains of its ancient castle. The situation of Loches, in the rich and beautiful valley of the Indre, and the historical associations connected with it, renders it one of the most interesting towns in Touraine. A great part of the castle, in which several of the kings of France resided, and which also served as a state prison for illustrious political offenders, is now in ruins, with the exception of the keep, which is used as a prison, and a more modern portion, in which the sub-prefect resides. Between the keep and the residence of the sub-prefect is the church of St.-Ours, which has a stone roof surmounted by two lofty pyramidal spires; the tomb of Agnès Sorel, mistress of Charles VII., is in this church. At a short distance from the town, and near the forest of Loches, which supplies mast timber to the French navy, are the ruins of the Carthusian convent of *Liget*, founded by Henry II. in expiation of the murder of Becket. The town of Loches presents narrow streets and ancient houses; it has a tribunal of first instance, a college, and 4581 inhabitants, who manufacture linen, coarse cloth, woollen yarn, and paper. *La-Haye-Descartes*, the birth-place of Descartes, is prettily situated on the right bank of the Creuse, and has 1459 inhabitants. *Ligueil*, W. of Loches, stands on the Estrigneuil, a feeder of the Creuse, and has 1929 inhabitants, who grow great quantities of plums. *Le-Grand-Pressigny*, on the right bank of the Claise, with a population of 1876; and *Preuilly*, further south on the same bank of the Claise, which has iron forges and 2264 inhabitants, give name to cantons.

The department forms the see of the Archbishop of Tours, is included in the jurisdiction of the Cour Royale and University Academy of Orléans, and belongs to the 4th Military Division, of which Tours is head-quarters. Under the monarchy it returned 4 members to the Chamber of Deputies; it now has 8 representatives in the National Assembly.

(*Dictionnaire de la France*; Richard, *Guide Classique du Voyageur en France*; *Statistique de France*; *Annuaire pour l'An* 1849.)

INDUCTION (Mathematics). The method of induction, in the sense in which the word is used in natural philosophy, is not known in pure mathematics. There certainly are instances in which a general proposition is proved by a collection

of the demonstrations of different cases, which may remind the investigator of the inductive process, or the collection of the general from the particular. Such instances however must not be taken as permanent, for it usually happens that a general demonstration is discovered as soon as attention is turned to the subject.

There is however one particular method of proceeding which is extremely common in mathematical reasoning, and to which we propose to give the name of *successive induction*. It has the main character of induction in physics, because it is really the collection of a general truth from a demonstration which implies the examination of every particular case; but it differs from the process of physics inasmuch as each case depends upon one which precedes. Substituting however demonstration for observation, the mathematical process bears an analogy to the experimental one, which, in our opinion, is a sufficient justification of the term 'successive induction.' An instance of the method will enable the mathematical reader to recognise a mode of investigation with which he is already familiar.

Example.—The sum of any number of successive odd numbers, beginning from unity, is a square number, namely, the square of half the even number which follows the last odd number. Let this proposition be true in any one single instance; that is, n being some whole number, let 1, 3, 5, ... up to $2n + 1$ put together give $(n+1)^2$. Then the next odd number being $2n + 3$, the sum of all the odd numbers up to $2n + 3$ will be $(n + 1)^2 + 2n + 3$, or $n^2 + 4n + 4$, or $(n + 2)^2$. But $n + 2$ is the half of the even number next following $2n + 3$: consequently, if the proposition be true of any one set of odd numbers, it is true of one more. But it is true of the first odd number 1, for this is the square of half the even number next following. Consequently, being true of 1, it is true of $1 + 3$; being true of $1 + 3$, it is true of $1 + 3 + 5$; being true of $1 + 3 + 5$, it is true of $1 + 3 + 5 + 7$, and so on, *ad infinitum*.

INDUCTION (ἐπαγωγή). According to Sir William Hamilton the word has been employed to designate three very different operations:—1. The objective process of investigating particular facts, as preparatory to Induction, which he observes is manifestly not a process of reasoning of any kind; 2. A material illation of a universal from a singular, as warranted either by the general analogy of nature or the special presumptions afforded by the object matter of any real science; 3. A formal illation of a universal from the individual, as legitimated solely by the laws of thought and abstracted from the conditions of any particular matter. The second of these operations is the inductive method of Bacon, which proceeds by means of rejections and conclusions, so as to arrive at those axioms or general laws from which we may infer by way of synthesis other particulars unknown to us, and perhaps placed beyond reach of direct examination. ('Nov. Org.,' 'Aph.,' c. iii. c. v.) Aristotle's definition coincides with the third, and induction 'is an inference drawn from all the particulars.' ('Prior. Analy.,' ii. c. xxiii.) The third alone is properly an induction of logic; for logic does not consider things, but the general forms of thought under which the mind conceives them; and the logical inference is not determined by any relation of causality between the premiss and conclusion, but by the subjective relation of reason and consequence as involved in the thought. The inductive process is exactly the reverse of the deductive; for, while the latter proceeds from the whole to the part, the former ascends from the part to the whole: since it is only under the character of a constituted or containing whole, or as a constituent and contained part, that anything can become the term of logical argumentation. Of these two processes Professor Hamilton gives the following figures:—

Induction.	Deduction.
X Y Z are A.	B is A.
X Y Z are whole B.	X Y Z are under B.
∴ whole B is A.	∴ X Y Z are A.
Or,	Or,
A contains X Y Z.	A contains B.
X Y Z contains B.	B contains X Y Z.
∴ A contains B.	∴ A contains X Y Z.

INDUCTION. [Advowson; Benefice.]

INDULGENCE is a power claimed by the Roman Catholic Church of granting to contrite and confessed sinners remission of the penalty which they ought to suffer here or hereafter in expiation of their sins. We may observe that indulgences are granted in some cases to those who give money for the building of churches and other pious purposes, but that the sale of or traffic in indulgences has been severely reprobated by many councils.

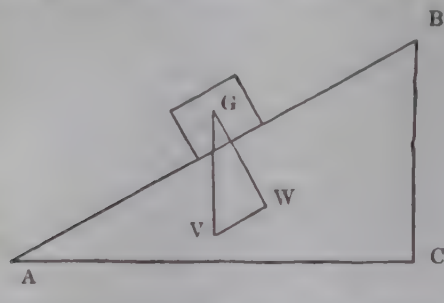
INDUS (the Indian), a constellation of Bayer, situated between Sagittarius and the South Pole.

INDUS. [Hindustan.]

INEQUALITY. (Astronomy.) For sake of convenience, the average motion of a planet or satellite, supposed to be made in a circle which has the average distance of the body from the sun or primary for its radius, is the first object of calculation when the place of the body at some future time is to be predicted. All the alterations which are rendered necessary by the unequal motion of the planet are called inequalities.

INE'RTIA. This word means something equivalent to the modern English sense of inactivity, or rather of incapability, and expresses that property of matter by which it does not change its own state of rest or motion, but requires for that purpose the action of some external cause, to the magnitude of which the change is in proportion. Previous to some remarks upon the use of this word, we shall give at length the third definition of Newton's 'Principia,' from which the common usage of it is derived. 'The *vis insita*, or innate force of matter, is a power of resisting by which every body, as much as in it lies, endeavours to persevere in its present state, whether it be of rest or of moving uniformly forward in a straight line. This force is ever proportional to the body whose force it is, and differs in nothing from the inactivity of the mass but in our manner of conceiving it. A body, from the inactivity of matter, is not without difficulty

prop el the heavy body down the plane. Now VW is to VG as BC is to AB; that is, a weight



placed upon an inclined plane is propelled down the plane by such a fraction of the whole pressure of the weight as the height of any section of the plane is of its length.

If, then, it were required to draw the heavy body G up the plane, any pressure exceeding VW would be sufficient for the purpose; and a pressure equal to VW, applied in the direction AB, would keep the weight at rest.

If a body be allowed to descend by gravity on an inclined plane, the force of descent is, to the force downward in a vertical direction, as WV to GV, or as AB to BC; that is, if θ be inclination BAC, and g represent the force of gravity vertically, as $g \sin \theta$ to g. Hence, if v represent the velocity on the plane and s the space descended from a state of rest in the time t, we have $v = g \sin. \theta. t$, $s = \frac{1}{2} g \sin. \theta. t^2$, and $v^2 = 2g \sin. \theta. s$. [Accelerated Motion.]

From these formulæ it may be shown that the velocity acquired by a body in descending from the top to the foot of a plane, whatever be its inclination, is the same as in falling vertically from the top to a horizontal plane passing through the foot.

If k be a fraction representing a portion of a weight W, to which the friction is equivalent; then, W cos θ (represented by GW) being the pressure of W on the plane, k W cos θ will represent the resistance caused by friction on the plane; and, if this be less than W sin θ, the impelling force on the plane, the weight will move downwards with an accelerating force g (sin $\theta - k$ cos θ).

There are many remarkable properties connected with the motion or equilibrium of bodies on inclined planes; but the preceding are those which are most fundamental and most frequently required.

INCLOSURE. The term Inclosure is applied to the inclosing and partitioning of lands in England and Wales, which are comprehended under the general name of Commons or Common Lands. It is necessary to define the terms Commons, and Commonable and Intermixed Lands. Commons or Common Lands are lands in a state of nature or waste, of which individuals have not the severalty. Commonable Lands are those lands which during a part of the year are in severalty, that is, occupied severally by individuals as their own, to the exclusion for the time of other people. The amount of common land in England is not known, but it is conjectured that it may be about 8,000,000 of acres: the total area of England and Wales is supposed to be about 37,000,000 acres.

The amount of commonable and intermixed lands is not known. The nature of these commonable and intermixed lands may be collected from the following instances. 'There are many parishes in the kingdom that consist altogether of intermixed or commonable lands; there are others in which there is a great intermixture of common land with the commonable and intermixed land. The township of Barmby on the Marsh in Yorkshire contains 1692 acres. There are 1152 pieces of open land, which contain 1015 acres, giving an average size of 3 roods 23 perches, and there are 352 old inclosures containing 677 acres. In the parish of Cholsey in Berkshire, the total contents of which are 2381 acres, there are 2315 pieces of open land, which contain 2327 acres, giving an average size of one acre.' This open land generally consists of long strips, too narrow to be ploughed across. Yet much of this land is the best in the kingdom for natural fertility, and is the oldest cultivated land.

Common Rights, that is, rights of pasture and so forth on commons or waste lands, are described generally under Common, Rights of. Common pasture lands require an improved management. It is stated that commons are generally overstocked, partly in consequence of persons turning out more stock than they have a right to do, and partly by persons putting their stock on the common who have no right.

Inclosures of land have now been going on for many years. It is stated that since 1800 about 2000 inclosure acts have passed; and prior to that time about 1600 or 1700. It seems doubtful from the evidence whether the 1600 or 1700 comprehend all inclosure acts passed before 1800. These inclosure acts (with certain exceptions) are private acts, and the expense of obtaining them and the trouble attendant on the carrying their provisions into effect have often prevented the inclosure of commons.

In 1836 an act (6 & 7 Wm. IV. c. 115) was passed for facilitating the inclosure of open and arable fields in England and Wales. In pursuance of the recommendation of a Committee of the House of Commons, which sat in 1844, an act of parliament was passed in 1845 (8 & 9 Vict. c. 118), the object of which is thus stated in the preamble:—'Whereas it is expedient to facilitate the inclosure and improvement of commons and other lands now subject to the rights of property which obstruct cultivation and the productive employment of labour, and to facilitate such exchanges of lands, and such divisions of lands intermixed or divided into inconvenient parcels, as may be beneficial to the respective owners; and it is also expedient to provide remedies for the defective or incomplete execution, and for the non-execution of powers created by general and local acts of inclosure, and to authorise the renewal of such powers in certain cases,' &c.

(*Report from the Select Committee on Commons Inclosure, together with the Minutes of Evidence and Index.* The Report is accompanied with maps which explain various parts of the evidence

INCOMMENSURABLES, THEORY OF. The application of arithmetic to any science of concrete magnitude supposes a certain magnitude to be taken as unity, and all other magnitudes to be expressed by the number of times or parts of times which they contain this unit. Such an application therefore requires the assumption of this proposition, that all magnitudes are either fractions or multiples, or compounded of fractions and multiples, of any magnitude that may be named. This proposition is not true; for instance, if the sides of a square be called 1, no number nor fraction whatsoever will exactly represent the diagonal. But it may be made as nearly true as we please: for instance, we may find a line as nearly equal to the diagonal as we please, which shall be a definite arithmetical fraction of the side. Quantities which are so related that, when one is capable of being represented in terms of a certain unit the other is not, are called *incommensurables*. The reason is as follows:—any two magnitudes which have a common measure can be arithmetically represented by the same unit: for, if A and B have the common measure M, and if this measure be contained 7 times in A and 10 times in B, then it is evident that, by taking M as the unit, A is represented by 7, and B by 10. If, then, there be two magnitudes which cannot be represented by means of the same unit, they cannot have any common measure, and are therefore *incommensurable*.

The difficulty thus inherent in the application of arithmetic to concrete magnitude is not met with in practice, because no case can arise in which it is necessary to retain a magnitude so closely that no alteration, however small, can be permitted. But in exact reasoning, where any error, however small, is to be avoided, it is obvious that the arithmetic of commensurable magnitudes, and the arithmetic (if there be such a thing) of incommensurable magnitudes, must not be confounded. The difficulty was overcome by Euclid, in his doctrine of proportion, so completely and effectually, that nothing has been added to his solution of it except unsuccessful attempts to evade it. Those who avoid the fifth book of Euclid generally substitute either the tacit assumption that all magnitudes are commensurable, which is not true, or some metaphysical play upon words, which a person who feels the rigour of Euclid places on the same shelf with nature's horror of a vacuum, and other explanations of the same kind. We could even point out a celebrated work on geometry which expressly rests on being able to make its errors too small to be perceived by the senses, and asks for no other reception of propositions which involve incommensurables.

INCREMENT and DECREMENT. When two quantities are considered together, one of which is greater or less than the second, the latter is said to be the former with an increment or decrement. In the older English writings the calculus of differences is called the method of increments.

INCUMBENT. [BENEFICE.]

INDEFINITE means 'not given or defined in magnitude.' Thus a definite straight line is that of which the extremities are known; an indefinite straight line is one of which the direction is given, and which may be supposed to have any length, or which can be lengthened, if necessary, without contravening any of the conditions of the problem. Thus Euclid, in the first book, constructs an equilateral triangle upon a definite straight line, and shows how to draw two lines making with one another the same angle as that made by two given definite straight lines.

There is however a reprehensible use of the word indefinite which is found in many mathematical works; namely, the employment of it to avoid the odium which attaches to the word infinite. Thus we hear of making a magnitude indefinitely great, of an indefinitely small arc being equal to its chord, of the circle being a polygon of an indefinitely great number of sides. In all cases it would be better, with a proper definition, to use the word infinite at once.

A want of proper distinction between definite and indefinite sometimes leads to confusion. For instance, it is said that, if a straight line be halved, if its half be then halved, and if fresh portions be continually taken, each of which is the half of the preceding, the result will at last become less than 'any line which can be named.' This is not true if the line which is to be named be indefinite; that is, if we may at any part of the process make it as small as we please: for it is obvious that, whatever a line may be, a smaller line can be named. But it is true of a definite line, made definite, or given in length, at the beginning of the process. Name any line, however small, but such as you name it let it remain; then by continually halving any other line, however great, you must at last arrive at a line which is less than the length you named. The phraseology of a line 'less than any line which can be named' has often caused a difficulty by not specifying the time at which it is to be named. The language used by Euclid himself is as follows (book x. prop. 1), and is free from the ambiguity in question: 'Two unequal magnitudes being given, if from the greater be taken away its half, and from what is left its half, and if this be done continually, a magnitude will at last be found which is less than the lesser of the two given magnitudes.'

INDENTURE. [DEED.]

INDEPENDENTS, the name of a denomination of English Protestant Dissenters. They are distinguished from Presbyterians and Baptists by being opposed to any union or government of the Church, and by regarding each congregation of faithful men as independent of every other, and competent to its own government without any interference from presbyteries, bishops, or from the state: this is the core principle of English Independency.

Robert Brown, a clergyman of the reign of Elizabeth, is generally reputed to be the first person in England who acted upon these opinions. After he had given no small trouble to the authorities in the Church, he was presented to the living of Achurch in Northamptonshire. A full account

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his person will be found in the 'Biographia tannica.' He closed a long and very troubled life in the gaol of Northampton, or very soon after he had left it, in 1630.

During the Commonwealth, the Independents were active in preventing the establishment of a Presbyterian church in England. Among the Independent sect was Cromwell. In 1662 the Act of Uniformity was passed, the object of which was to exclude from the ministerial office in the Church of England divines of either of those opinions. The effect of it was, that about 1900 ministers retired from the places they held in the Church. Some make them 2000. The Revolution of 1688 freed the Dissenters from the penalties in the way of fine and imprisonment which were imposed upon them during the reign of Charles II., one of the first acts of the new government being to grant toleration to them, that is, to allow them to open chapels, and to conduct the services under the protection of law.

The 'Act of Toleration' was passed in 1689, and for the seventy years succeeding that date the Independent denomination (as indeed was the case with the whole body of Dissenters) decreased, and it would probably by this time have become extinct, but for the extraordinary revival of religious zeal, created especially by the Wesleys and Whitefield. Under this influence a large number of persons were led to join themselves to one of the three Methodist bodies; the Wesleyan Methodists, the Whitefieldian Methodists, or the Countess of Huntingdon's Connection; but there were many who declined to unite themselves with any of these, and formed themselves into separate churches upon Independent principles.

The Independents have numerous chapels in London and in various parts of the country, with many very popular ministers. They have also several institutions for the education of their ministers.

INDETERMINATE, a word which is mostly applied in mathematics, not to the character of a magnitude, but of a problem. A question is said to be indeterminate when it admits of an infinite number of solutions: if the number of solutions, few or many, be finite, the problem is sometimes, but we believe not most frequently, called indeterminate.

INDIA. [HINDUSTAN.]

INDIAN RUBBER. [CAOUTCHOUC.]

INDIA'NA, one of the United States of North America, is bounded S.E. by the river Ohio, which divides it from Kentucky, E. by the state of Ohio, N. by Michigan, and W. by the state of Illinois. It lies between 37° 45′ and 41° 52′ N. lat., and between 84° 42′ and 87° 49′ W. long. The mean length is 260 miles, and the mean breadth 140 miles. The area is 36,000 square miles. The population in 1840 was 685,866, none of whom were slaves.

The Ohio and the Wabash are the most important rivers. [OHIO.] The Wabash rises in Ohio, and flows thence into this state. Its whole course through Indiana, and along its western boundary, is between 500 and 600 miles, all navigable except at its falls or rapids. All the other principal rivers of the state are tributaries of the Wabash: the White River is formed of two main branches, of which the northern has a S.W. course of about 300 miles, and the East Fork has also a general S.W. course of 200 miles. The Wabash also receives the Tippecanoe and the Eel River from the N.E., then the Missisinewa from the S.E., and Little River from the N.E. Many streams fall into the Ohio, but none of much magnitude. The same remark applies to those which flow into Lake Michigan.

This state, like Illinois, has a general slope to the S.W. Like that state also, it is, with few exceptions, one great plain. There is indeed a tract of hilly country north of the great bend of the Wabash, and the state is skirted on the south by those eminences called the Ohio Hills, which sometimes touch the Ohio and sometimes retire from it for two or three miles; they occasionally rise 300 feet above the river. The timbered and prairie lands are more intermixed in this state than is usual; and the alluvial river-bottoms are all wide. The soil is admirably suited for grass and grain. The climate is somewhat more equable than that of Illinois, and milder than that of western Pennsylvania. It is everywhere healthy except in the neighbourhood of the wet prairies and swamps. Iron, copper, coal, and salt have been found, but little of any of them has yet been wrought.

The agricultural products of the state are wheat, maize, tobacco, and a little cotton; swine and cattle are also reared. The most successful vineyards in the United States are at Vevay on the Ohio. They are managed by the Swiss settlers at that place, and consist of native species of the vine.

The Wabash and Erie Canal extends from Lafayette on the Wabash, 187 miles, to Toledo, on the Maumee Bay, 100 miles being in Indiana and 87 miles in Ohio. The White Water Canal extends from Lawrencebury 30 miles to Brookville. The Central Canal, parts of which have been completed, is designed to be 290 miles long. The Madison and Indianopolis Railroad extends from Madison on the Ohio 95 miles to Indianopolis.

Indiana is divided into 87 counties. The following are the principal towns, with the population of each in 1840:—*Indianopolis*, the capital of Indiana, is situated near the centre of the state, on the east bank of White River, which is navigable thus far at high water. It contains a state-house, governor's house, and court-house. Population, 2692. *La Fayette* is 70 miles N.W. from Indianopolis. Population about 2000. *Madison*, on the north bank of the Ohio, 85 miles S.E. from Indianopolis, has an active trade. Population, 2798. *New Albany*, on the north bank of the Ohio, 121 miles S. by E. from Indianopolis, has a court-house, gaol, and 9 places of public worship. Population, 4226. *Terre Haute* is situated on the east bank of the Wabash. Population, 2500. *Vevay*, 94 miles S.E. from Indianopolis, on the northern bank of the Ohio, was settled by emigrants from Switzerland. Population, about 1200. *Vincennes*, on the e

bank of the Wabash, 118 miles from Indianopolis, was settled by the French, and is the oldest town in the state. Population, about 2000.

Madison University, at South Hanover, 93 miles S.E. from Indianopolis, is the chief educational establishment of the state. The Baptists are the most numerous sect, and next to them the Presbyterians and Methodists. The legislative body consists of 50 senators and 100 representatives. The state sends 2 senators and 10 representatives to congress.

Indiana was included in the cession of Virginia to the United States in 1787. It was placed under a territorial government with Illinois in 1800, and under a separate government in 1809. In 1816 it became a state, and formed its present constitution.

INDICATORI'NÆ, Mr. Swainson's name for the Honey Guides, a subfamily of cuckoos (*Cuculidæ*).

There appears to be but one genus, *Indicator* (De Vaillant), which is thus characterised :—Bill straight, finch-like; the base triangular; the sides compressed. Culmen and gonys equally inclined towards the tip; gonys angulated. Wings lengthened, pointed. Tail moderate, rounded. Feet short. Middle toe much longer than the tarsus. Locality, Africa.

The species are not numerous. The stories told of these birds indicating the nest of bees and guiding men to them by their motions and cries, from the time of Sparrman downwards, appear to be perfectly authentic, though some great travellers affected to disbelieve them.

Mr. Steadman, in his 'Wanderings and Adventures in South Africa' (1835), says, 'The little honey-sucker, or Indicator, kept fluttering before us with its cry of *cherr, cherr*, as if inviting us to follow. It is frequently known to conduct travellers to a nest of honey deposited in the hollow of a tree. I have however heard many instances mentioned of its stopping short of the hive, and hovering over a spot where a lion or tiger has been reposing, justly establishing its character as an indicator.' [CUCULIDÆ; CUCULINÆ.]

INDICTION. [CHRONOLOGY.]

INDICTMENT is a written accusation of one or more persons of a crime or misdemeanour preferred to and presented by a grand jury. The decision of the grand jury is not a verdict upon the guilt of the accused, but merely the expression of their opinion that the matter is fit to be presented to the common jury, and in conducting the inquiry the evidence in support of the accusation only is heard. If the grand jury think the accusation groundless, they indorse upon the bill 'not a true bill,' or 'not found;' if the contrary, 'a true bill;' and in finding a true bill twelve at least of the grand jury must concur. When a bill is found to be a true bill, the trial of the accused takes place in the usual form; and when the bill is found not to be true, or, as it is frequently called, 'ignored,' the accused is discharged, but a new bill may be preferred against him before the same or another grand jury.

INDIGO, a well-known and beautiful blue vegetable colour, which is extensively employed in dyeing and calico printing. The plants from which it is mostly obtained belong to the genus INDIGOFERA.

When the plant is in full flower, it contains most colouring matter. It is then cut, and put into vats, and covered with water; fermentation takes place, accompanied with the evolution of carbonic acid and probably other gaseous products, and the yellow liquor is covered with a froth which in a little time becomes of a violet colour, and a substance is dissolved which is rendered blue by absorbing the oxygen of the air, and being then rendered insoluble it is precipitated; and this, when collected and dried, is indigo.

The usual appearance of indigo as it occurs in commerce is that of nearly cubical cakes of an intense blue colour and earthy fracture. Indigo seldom contains more than about half its weight of pure colouring matter, and frequently much less.

When common indigo has been treated with dilute acids, alkalis, and alcohol, the remainder is *indigotin*, or indigo, nearly in a state of purity. It is composed of hydrogen, 3.93; carbon, 72.34; oxygen, 12.60; nitrogen, 11.13.

The quantity of indigo consumed in Great Britain and Ireland amounts to about 2,500,000lbs. annually.

INDIGO'FERA, a genus of plants of the natural family of *Leguminosæ*, indigenous in the equinoctial parts of Asia, Africa, and America, and celebrated for some of the species yielding indigo. The species are about 150 in number. *I. tinctoria* is the species generally cultivated in India, whence it has been introduced both into Africa and America. *I. Anil* is said by De Candolle to grow wild in America, and to be cultivated in both Indies, as also along the Gambia in Africa. *I. cærulea* is a new Indian species described by Dr. Roxburgh, who states that from the leaves he had often extracted a most beautiful light indigo, more so than he ever could from the common indigo plant. It flowers during the wet and cold seasons. *I. argentea* is the species cultivated in Egypt and Barbary for the sake of its indigo, and, according to Humboldt, also in America. *I. disperma*, according to Humboldt, is also one of the species cultivated in America, and seen among the most ancient hieroglyphical paintings of the Mexicans. Dr. Bancroft considers it as the species called Guatemala indigo, which yields fine pulp, but is less productive than other species.

Plants of other genera are also employed for obtaining indigo; as *Wrightia tinctoria*, *Marsdenia tinctoria*, *Galega tinctoria*, but especially the two first. Dr. Bancroft also adduces *Spilanthes tinctoria*, *Scabiosa succisa*, *Cheiranthus fenestralis*, and several others, as all yielding a blue dye, or coarse sort of indigo.

INDORE, a city of Hindustan, in the province of Malwa, and the capital of the dominions of Holkar. Indore is in 22° 42′ N. lat., and 75° 50′ E. long. It is a modern city, the old city on the same site having been wholly destroyed by fire by Sindia, in 1801, during the war between that chief and Holkar. The extension of the city since 1818 has been extremely rapid, and its

population is now about 60,000. The streets are spacious and paved; a great proportion of the houses are of two stories, and built of masonry, but there are many mud dwellings interspersed. The raja's palace, which was begun in 1819, is a large quadrangular granite building.

INDRE, a department in France formed out of the western portion of the old province of Berri, is bounded N. by the department of Loir-et-Cher, E. by that of Cher, S. by those of Creuse and Haute-Vienne, and W. by those of Vienne and Indre-et-Loire. It lies between 46° 21′ and 47° 16′ N. lat., 0° 53′ and 2° 12′ E. long., and measures 64 miles in its greatest length, with a mean breadth of 54 miles. The area is 2660 square miles, and the population in 1846 was 263,977; which gives 99.24 to the square mile, being 74.51 below the average per square mile for all France.

The department is in general very flat; the only hills of any considerable size are the granitic swells on the southern border, and the gentle slopes that diversify the valleys of the Creuse and the Indre. The surface presents three marked and distinct divisions. The first called *Bois-Chaud* comprises 7-tenths of the whole department, including the arrondissements of La-Châtre, a great portion of those of Châteauroux and Le-Blanc, and a third of that of Issoudun; it is divided, where arable, into a great number of small farms, and presents a very varied appearance, from the number of its hedges, ditches, and woods. The second division, distinguished by the name of *Champagne*, is a flat treeless country, without hedge or inclosure of any kind, divided into large farms, and comprising 2-thirds of the arrondissement of Issoudun and a part of that of Châteauroux. The third division, called *La Brenne*, comprises parts of the arrondissements of Châteauroux and Le-Blanc, and presents a flat surface, without inclination, and covered with shallow ponds, which rest on a bottom of compact clay, and which, by their pestilential exhalations, are very injurious to health. The land varies greatly in quality, from light moss or barren sand to stiff clay, and from the vegetable mould, half covered with flints, to the rich homogeneous soil called *terre de Beauce*, which is considered the most productive, and covers 194,790 acres. The flinty soils, amounting to 111,626 acres, are best adapted for vine culture. All the land capable of cultivation is tilled, but agriculture is in a backward state.

The department takes its name from the river *Indre*, which rises just within the department of Creuse, and entering that of Indre flows N.W. past Sainte-Sévère, La-Châtre, Châteauroux, and Châtillon, below which it enters the department of Indre-et-Loire; here passing Loches, where it becomes navigable, it continues in the same direction as far as Montbazon, and then turning W. passes Azay-le-Rideau, below which it enters the Loire between the embouchures of the Creuse and the Vienne. Its whole length is 124 miles, of which 44 are navigable; its mean width is 98 feet, and its ordinary depth from 5 to 6 feet. It is subject to floods, which rise from 10 to 11 feet at most, and spreading beyond the banks sometimes do great damage, but add greatly to the fertility of the soil. The number of mills along the banks of this river is very great. The south and south-west of the department is drained by the Creuse and its feeder, the Anglin, which is itself increased by the Abloux. [CREUSE.] The west of the department is drained by the *Claise*, a feeder of the Creuse, which flows through the marshy district of Brenne; and the east and north are drained by feeders of the Cher, namely, the *Aron*, which receives the Théols, and the *Fouzon*, fed by the Nahon.

The department is crossed by a railroad, which branches off from the Orléans-Bourges Line at Vierzon, and runs through Issoudun to Châteauroux. It is traversed also by 6 royal, 16 departmental, and 31 parish roads.

The department contains 1,702,248 acres, distributed among 86,977 proprietors, and into 1,050,523 parcels. Of this surface 992,215 acres are under tillage; 210,796 consist of natural pasture; 44,752 acres are under vine culture; 166,609 are covered with woods and forests; 185,368 acres consist of sands, heaths, and barren moors; 18,274 acres are occupied as orchards, nurseries, gardens, and plantations of different sorts; and 31,055 acres are covered with ponds, rivers, canals, &c. The common breadstuffs are produced in quantity more than enough for the consumption; buck-wheat, hemp, flax, chestnuts, and fruits are also grown. The annual produce of wine is 6,600,000 gallons, about one-half of which is exported. Although the pasture land is of no great extent, yet considerable numbers of horned cattle are kept; hay is saved for their winter food, and in summer the scantiness of the pasture is eked out with the leaves of trees, especially with those of the elm. Sheep are a source of great profit to the farmer, on account of the fineness of their wool; the quality of the wool of the *Champagne* district especially is very superior. The sheep are very carefully tended; ewes, lambs, hogs, and wethers, are kept in separate flocks each under its own shepherd: they are never folded; when the winter is severe, they get a mixture of hay and straw three times a day. Great numbers of geese and turkeys are reared, and also of mules, pigs, and horses. The climate is mild and healthy, except in the Brenne district, where the atmosphere is almost always charged with pestilential fogs.

Several iron mines are worked; marble, millstone, limestone, mica, flint, lithographic stone, granite, quartz, spar, marl, potter's clay, variegated marbles, &c., are found.

The cloth manufactures of Châteauroux and some other places are important; linen, hosiery, scythes, paper, porcelain, and earthenware are made. There are also numerous establishments for the manufacture of woollen yarn, leather, beer, parchment, &c. The number of iron forges and foundries is 17; of wind and water mills 573; and of factories of different kinds, 21. The most important iron-works are those of Clavières. The commerce of the department is composed of the various agricultural and industrial products named. About 340 fairs are held in the year, principally for the sale of sheep.

The department is divided into 4 arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1846.
Châteauroux .	8		98,743
Le-Blanc . .	6	64	59,771
Issoudun . .	4	53	49,168
La-Châtre . .	5		56,295
Total . .	23	276	263,977

Of the arrondissement of Châteauroux and of the whole department, the capital is CHATEAUROUX. *Argenton-sur-Creuse*, 16 miles S. by W. from Châteauroux, is built on both banks of the Creuse, and consists of an upper town which grew up round an ancient castle now in ruins, and of a lower town joined to the former by a stone bridge. The most remarkable structures now remaining in the upper town, which is entered by 4 gates, are the Gate of Auditory, now used as a prison, and the desecrated church of St.-Benoît, now used as the corn market, on the roof of which are still seen the arms of Louis de Bourbon, count of Vendôme. Linen, cloth, tiles, bricks, woollen yarn, paper, leather, &c., are manufactured in the town, which has 4346 inhabitants. *Ardentes-St.-Vincent*, on the right bank of the Indre, has 2162 inhabitants. *Bourg-Dieu* or *Déols*, formerly a large town, and the capital of lower Berri, now a village of 2344 inhabitants, stands about a mile N. of Châteauroux. It was celebrated for its Benedictine Abbey, the suppression of which by Gregory XV. in 1623, caused the decay of the town. Of the vast buildings of the abbey, only a single tower is now standing; the magnificent ruins which remained till 1830 were then sold and removed as materials for building. *Buzançais*, prettily situated 13 miles W. of Châteauroux on a hill on the right bank of the river Indre, which is here crossed by five bridges, is an ill-built town with 4430 inhabitants, who manufacture coarse woollens and woollen yarn. There are several flour mills in the town, and in the environs there are large iron works. *Châtillon-sur-Indre*, formerly an important fortress on the frontiers of Berry, is built on a height crowned by the ruins of an ancient castle, near the left bank of the Indre, 26 miles N.W. from Châteauroux, and has 3575 inhabitants. The church is a large and handsome structure, which dates from the 10th century, and contains some remarkable sculptures. In the principal street there is an ancient house, on the front of which are figures of Momus and a player on the pipe. From the market place there is a fine view of the valley of the Indre. *Levroux*, the ancient *Gabatum*, stands on the Nahon, 12 miles N. from Châteauroux, and has 3166 inhabitants, who manufacture cloth and leather, and deal in corn, wine, wool, and cattle. The parish church of Levroux is considered the finest in all Lower Berry. Several Roman remains and Celtic coins have been found in and near this town, some of the fortifications of which still remain. *Valençay*, farther N. on the left bank of the Nahon, has a population of 3229, and manufactures of hosiery, cloth, cutlery, and fine woollen yarn. The great ornament of Valençay is the magnificent château or rather palace built in the reign of François I., by the family of Etampes; it is surrounded by a large park, in which there are beautiful gardens and waterworks. This château was the prison of Ferdinand VII., king of Spain, from 1808 to 1814; it was the property of Talleyrand, who for some time made it his residence.

In the arrondissement of Le-Blanc, the chief town, *Le-Blanc*, is beautifully situated on the Creuse, here crossed by a handsome bridge, above which the river expands so as to form a lake, and below it breaks into cascades, generating force to drive the machinery of several factories. The town is not well built, but it is improving, and has considerable cloth factories, vinegar works, potteries, a linen-yarn mill with 3600 spindles, a large brewery, and several iron forges and smelting furnaces. It is the seat of a tribunal of first instance, and has a savings' bank, and 5290 inhabitants, who trade in wine, fish, timber staves, and the articles named before. *Bélâbre*, S. by E. of Le-Blanc, on the right bank of the Anglin, has 2175 inhabitants, and some remains of an ancient castle. *Mezières-en-Brenne*, under 2000 inhabitants, stands N. by E. of Le-Blanc, on the right bank of the Claise, in a district not long ago an unapproachable marsh, but now drained, planted, and well cultivated. There is a remarkable church here, which was dedicated in 1339 to Sainte-Marie-Madeleine, and contains many mementoes of the family of Anjou. *St.-Gaultier*, E. of Le-Blanc, on the Creuse, which is here passed on a suspension bridge, has an ecclesiastical college, and a population of 1793.

In the arrondissement of Issoudun, the chief town, *Issoudun*, is situated partly on the slope, and partly at the foot of a hill above the river Théols, which is here crossed by three bridges, leading to as many suburbs, in 46° 56′ 54″ N. lat., 2° 0′ 49″ E. long., at a distance of 17 miles by railway N.E. from Châteauroux, and has 12,234 inhabitants. The older part of the town, called Le Château, has very good houses, but the streets are dirty, narrow, and tortuous; the rest of the town is better built, having been constructed since the terrible conflagration of 1651, which broke out at a time when the city was assaulted by the army of the Fronde, and by which 12,000 houses were destroyed. The principal buildings are the residences of the prefect and the mayor; opposite the latter, in a picturesque garden, stands an ancient tower of great strength, called La Tour-Blanche, the walls of which are 14 feet thick, and rise to the height of 95 feet. Other remarkable objects are—the former town-gate and tower, now used as a prison; the hospital, in the chapel of which are some curious sculptured monuments; the former Ursuline convent, now a barrack; the former Carmelite convent, now a private residence, the theatre, and the several public walks. The town has tribunals of first instance and of commerce; a consultative chamber of manufactures, and a college. Woollen cloth and yarn, calico, hosiery,

parchment, leather, and beer are the principal industrial products; there are some bleaching establishments also, and a good business is done in the articles enumerated, and in corn, wine, wool, cattle, wood, timber, iron of superior quality, &c. *Vatan*, which stands 13 miles N.W. of Issoudun, has an ancient church dedicated to St.-Laurian, and rebuilt in 1005: population 2978. *Reuilly*, 9 miles N. by railway from Issoudun, stands near the Théols and has 2241 inhabitants. In the town there is a remarkable structure in the Renaissance style, which is called La Grande-Maison; and in the environs is the splendid residence of Ferté-Reuilly, built by Mansard in 1659 for Jacques de la Fond. An ancient Gothic church stands half a mile S. of the town, on the hill of Vergy, the summit of which was formerly crowned by a strong fortress.

In the arrondissement of La-Châtre, the chief town is *La-Châtre*, which stands in the most fertile and picturesque part of Berri, on a hill that skirts the Indre on one side and overlooks on the other a deep narrow valley laid out in gardens and orchards. It is situated in 46° 34′ 53″ N. lat., 1° 59′ 4″ E. long., 19 miles S.E. from Châteauroux, and has a tribunal of first instance, a college, and 4635 inhabitants. The streets are well but not regularly built, yet the town makes an agreeable impression from the charming scenery which is presented to view from almost every point. The most remarkable structures are the church and two ancient wooden houses. Woollen cloth and leather are manufactured; there is also a considerable trade in wool, goat skins, feathers, cattle, and chestnuts (of which large quantities are grown in the neighbourhood). *Aigurande*, S. of La-Châtre, has a population of 2005. *Neuvy-St.-Sépulchre*, said to occupy the site of the ancient *Noviodunum*, is 8 miles W. of La-Châtre, and has a population of 2003. *Sainte-Sévère*, formerly a strong fortress, now a village of about 1000 inhabitants, stands near the Indre, 6 miles S.S.E. from La-Châtre. Of its formidable defences which were with great difficulty mastered by Duguesclin, only a single tower remains.

The department forms, together with that of Cher, the see of the Archbishop of Bourges; it is comprised in the jurisdiction of the Cour Royale and University Academy of Bourges, and belongs to the 15th Military Division, of which Bourges is head-quarters. It returned 4 members to the Chamber of Deputies; it now has 7 Representatives in the National Assembly.

(*Dictionnaire de la France; Statistique de la France;* Richard, *Guide Classique du Voyageur en France: Annuaire pour l'An* 1849.)

INDRE-ET-LOIRE, a department in France, formed out of the old province of Touraine, is bounded N. and N.E. by the departments of Sarthe and Loir-et-Cher, E. and S.E. by those of Loir-et-Cher and Indre, S. by those of Indre and Vienne, and W. by those of Vienne and Maine-et-Loire. It lies between 46° 43′ and 47° 42′ N. lat., 0° 5′ and 1° 18′ E. long.; its greatest length from N. to S. is 68 miles, from E. to W. 55 miles. The area is 2360 square miles, and the population in 1846 was 312,400, which gives 132.37 to the square mile, being 41.38 below the average per square mile for all France.

The department takes its name from the INDRE, noticed in the preceding article, and the LOIRE, which crosses it from E. to W. The other rivers which ultimately or directly enter the Loire on the left bank are the CHER, which throws off several arms to the Loire, forming islands before its main stream enters that river: the Claise, which crosses the southern angle of the department [INDRE]: the CREUSE, which forms part of the south-western boundary: and the VIENNE, which enters this department at the point where it is joined by the Creuse, and, flowing in a north-western course past Chinon, enters the Loire on the extreme western boundary of the department. On the right bank the feeders of the Loire in this department are the Brenne and the Doit. The *Doit* rises in a pond W. of Savigné; flowing S. past Bourgueil, it turns W. and, under the name of *Authion*, runs for the distance of 40 miles parallel to the Loire, which it enters in the centre of the department of Maine-et-Loire at St.-Aubin-des-Ponts-de-Cé, S. of Angers. Except the Brenne, the Doit, and the Claise, all the rivers mentioned are navigable. The department is traversed by 6 royal and 28 departmental roads, and by the Orléans-Tours Railroad, now open to Tours, whence two branches in course of construction run, one S. through Poitiers and Angoulême to Bordeaux, the other W. through Angers to Nantes.

The Loire and its principal feeders are subject to great inundations, which frequently do incalculable damage to property on their banks. The most disastrous overflow of this kind on record occurred in October 1846, when in one night the Loire rose 20 feet, and continued to rise for two days, sweeping away bridges and viaducts, destroying many lives, and property to the amount of about 2,000,000*l.* sterling. On ordinary occasions such disasters are prevented by the enormous dykes that line both banks of this great river from the neighbourhood of Blois to the mouth of the Authion before mentioned, a distance of 93 miles. The dykes are 22 feet wide on the top, and so high as to intercept the view of the low grounds from passengers by the steamers that ply on the river; the parts most exposed to the flood are faced with uncemented masonry. The high road runs along the summit of the dyke on the right bank, and presents one of the finest drives in the world, curtained with poplars and diversified by the views of villas, towns, populous villages, and those curious dwellings hollowed out in the sides of the rocky hills that now and then approach the right shore.

To the north of the Loire the surface of the department is hilly, and presents three extensive forests and several vast barren and arid wastes. The cultivation here is rude in the extreme, and the population scanty. Along the banks of the Loire however a very different aspect presents itself; well-cultivated fields, luxuriant pastures and meadows, vineyards and orchards attesting equally the fertility of the deep alluvial soil and the industry of the inhabitants. Between the Indre and the Vienne there is a remarkable table-land, which contains an immense deposit

fossil shells. The great forests south of the Loire are those of Amboise, Loches, and Chinon. On the slopes surrounding the forest of Amboise are the vineyards that yield the rich Cher wines. In general the surface in this portion of the department presents strong deep wheat soils, rich pastures, vineyards, and orchards. There are however some barren wastes here as well as north of the Loire, but they are comparatively of small extent. The inundations of the rivers add greatly to the fertility of the soil.

The department contains 1,510,546 acres, distributed among 111,984 proprietors, and into 1,518,107 parcels. Of this surface 827,610 acres are arable land; 329,806 acres consist of grass land; 86,499 acres are under vine culture; 222,402 acres are covered with woods and forests; 155,630 acres consist of heath and moorland; 13,423 acres are under orchards, nurseries, plantations, &c.; 45,075 under various cultivation; 20,424 are covered with rivers and waters; and 50,631 are occupied by roads, streets, buildings, &c. The valleys of the Loire and the other principal rivers in this department contain some of the most fertile and best cultivated land in France. All kinds of breadstuffs are produced in quantity more than enough for the consumption. One of the most important products is wine, of which 13,816,000 gallons are made in ordinary years; next come hemp, walnuts for making oil, plums, beans, leguminous plants, liquorice, anise, and coriander; citrons, melons, almonds, apples, pears, truffles, &c. Bees and silkworms are carefully tended; game and fish are abundant.

Iron mines are worked; stone, especially a tufaceous sandstone, of which most of the houses are built, is quarried out of the hills near the Loire, and excavations thus formed are occupied as dwelling places by the poorer inhabitants. Millstone grit, marl, potter's clay, and brick-earth are found. Copper ore is met with, but no mines are worked.

The chief industrial products are bar iron, powder, and files; woollen cloth, of which manufacture Tours is the centre; silk, leather, paper, and pottery are also made, but the manufacture of these articles is not so important as formerly. The exports consist mostly of agricultural products, the imports of colonial produce, glass, cotton stuffs, fine linen and woollen cloth, furniture, haberdashery, &c. About 90 fairs for the sale of cattle and agricultural produce are held. The department contains 726 wind and water mills, 46 iron forges and smelting furnaces, and 199 factories of different sorts. Druidical or Celtic remains are numerous in this part of France.

The department is divided into 3 arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1846.
Tours . . .	11	119	157,062
Chinon . . .	7	109	91,244
Loches . . .	6	74	64,094
Total. . .	24	302	312,400

In the arrondissement of Tours, the chief town *Tours*, which is also the capital of the department, stands on the left bank of the Loire, in a plain that lies between that river and the Cher, in 47° 23′ 46″ N. lat., 0° 41′ 24″ E. long., 65 miles by railway S.W. from Orléans, and has 28,691 inhabitants. Tours, as well as Touraine, takes its name from the *Turones*, a Celtic tribe, of whose capital *Cæsarodunum* or *Cæsaromagus* it occupies the site. The entrance to the city from the Paris road is striking; a magnificent stone bridge of 15 arches, 475 yards in length, and 16 yards wide, leads across the Loire into a spacious square, formed by the wide river on the northern side, the fine buildings of the town-hall and the museum on the south, while the east and west sides are formed by two terraces planted with trees. Passing through the square, a straight wide street (Rue Royale) is entered, consisting of houses built in good taste and on a uniform plan; this street, which is furnished with foot-pavements, runs right across the town in its widest part, and terminates in the avenue of Grammont, at the end of which a bridge crosses the Cher into the Poitiers road. The other streets are, with few exceptions, ill-built, narrow, and crooked. There are several suburbs, but these can scarcely be distinguished from the town itself, as it has no ramparts except on the side next the Cher, and these are laid out so as to form the fine promenade called Le-Mail. The wide quays along the Loire, which is joined to the Cher by a canal, are a great ornament to the town; they extend on each side of the bridge, are planted with trees, and backed by large buildings. The most remarkable structures in Tours are—the cathedral, dedicated to St.-Gratien, the first bishop of Tours, the portal of which contains a magnificent rose window, and is surmounted by two towers 263 feet in height and terminating in domes; the cavalry barracks, built on the site of the English Henry II.'s castle, of which only a single tower now remains; two lofty towers in the Rue St.-Martin (one containing a clock, and hence called Tour d'Horloge, and the other called La Tour de Charlemagne, from the belief that Charlemagne's queen was buried beneath it), which are the only remains of the great cathedral of St.-Martin-de-Tours; the churches of St. Clément and de-la-Riche; the fountain of Beaune, which stands in the market-place, and consists of an octagonal basin filled with water, gushing in four jets from a central pyramid adorned with sculptures and arabesques; the archiepiscopal palace; the court-house; the college buildings; the general hospital; and the residence of the prefect, which also contains a public library of 40,000 volumes and several valuable manuscripts. Tours has a tribunal of first instance, a tribunal and chamber of commerce, one communal and two ecclesiastical colleges, a botanic garden, and several literary and scientific societies. The chief manufactures are woollen cloth, silk stuffs, ribands, serge, carpets, small wares, wax candles, woollen yarn, leather; the commerce is composed of these articles and of corn, wine, brandy, plums and dried fruit, hemp, wool, &c. Tours had, in the middle ages, one of the most important mints in

France, in which were coined the *livres tournoises*, often named in history, and each worth a franc. In one of the suburbs of Tours, called Riche (2000 inhabitants), stood the castle of *Plessis-les-Tours*, in which Louis XI. died; the keep is the only part of the edifice now standing. The other towns are AMBOISE, the castle of which is now (March 1849) the prison residence of Abd-el-Kader: *Bléré*, a busy little town of 3417 inhabitants, on the left bank of the Cher, which is here crossed by a bridge built by Henry II. of England: *Château-la-Vallière*, in the north-west of the department, which has iron forges and 1370 inhabitants: *Château-Renault*, which stands on the slope and at the foot of a hill in a pretty country on the Brenne, and has 2887 inhabitants, who manufacture cloth, flannel, leather, and tiles; the town is named from an old castle built in the year 981, and still standing: *Montbazon*, a small place on the right bank of the Indre, with a population of only 1181, but important for the great powder-mills and saltpetre-works near it: and *Vouvray*, which is situated 5 miles E. from Tours on the Loire, in a district famous for its white wine, and has 2443 inhabitants.

In the arrondissement of Chinon, the chief town *Chinon* is built on the Vienne, at the foot of a hill, the summit of which is covered with the ruins of the ancient fortress of Chinon, in which Henry II. died, and Joan of Arc had her first interview with Charles VII. It is 28 miles S.W. from Tours, and has a tribunal of first instance, a college, savings' bank, and 6785 inhabitants, who manufacture serge, drugget, haircloth, earthenware, saltpetre, &c., and trade in cattle, corn, wine, brandy, plums, nut-oil, honey, wax, &c. Chinon is an improving town; the old ramparts are now replaced by quays. *Azay-le-Rideau*, prettily situated on the Indre, about 5 miles above its junction with the Loire, is remarkable for a fine structure called Château-d'Azay, built on an island in the Indre; the town has 2105 inhabitants. *Bourgueil*, situated in a very fertile district on the right bank of the Doit, at a distance of 10 miles N. from Chinon, has a college, and 3493 inhabitants. *Cinq-Mars*, on the left bank of the Loire, near Langeais, is a small place of only 1728 inhabitants. It deserves notice on account of its ancient square tower, which is built of bricks, perfectly solid, 90 feet high, 13 feet wide on each face, and surmounted at the angles by four pinnacles, each 11 feet high; a central pinnacle was thrown down by a storm in 1571. The purpose and date of its erection are unknown. *Langeais*, 18 miles N.N.E. from Chinon, stands on the right bank of the Loire, and has 3138 inhabitants, who trade in agricultural produce and manufacture linen, tiles, and bricks. The castle in which Charles VIII. espoused Anne of Britanny is still in tolerable preservation, but has been converted into a stable. *Sainte-Maure* stands on the right bank of the Manse, 18 miles E. from Chinon, and has 2602 inhabitants, who manufacture linen, printed calicoes, and haircloth. The church of Sainte-Maure is one of the finest in Touraine; it dates from the twelfth century, and beneath it there is a crypt still more ancient. *Richelieu*, a well-built town, consisting of several wide straight streets that terminate in a handsome square in the centre of the town, stands 12 miles S. from Chinon on the Mable, and has 2832 inhabitants, who manufacture beet-root sugar and brandy, and have a considerable trade in wine, fruits, and other agricultural produce. Cardinal Richelieu erected a residence here in 1637, and the town was then built on a regular plan; the cardinal's palace is now a heap of ruins.

In the arrondissement of Loches, the chief town *Loches* stands on the left bank of the Indre, at a little distance from *Beaulieu*, a suburb of 2000 inhabitants, to which it is joined by several bridges thrown across the arms of the river. The town is 25 miles S. by E. from Tours; it is built round the base of a hill, the summit of which is crowned by the remains of its ancient castle. The situation of Loches, in the rich and beautiful valley of the Indre, and the historical associations connected with it, renders it one of the most interesting towns in Touraine. A great part of the castle, in which several of the kings of France resided, and which also served as a state prison for illustrious political offenders, is now in ruins, with the exception of the keep, which is used as a prison, and a more modern portion, in which the sub-prefect resides. Between the keep and the residence of the sub-prefect is the church of St.-Ours, which has a stone roof surmounted by two lofty pyramidal spires; the tomb of Agnès Sorel, mistress of Charles VII., is in this church. At a short distance from the town, and near the forest of Loches, which supplies mast timber to the French navy, are the ruins of the Carthusian convent of *Liget*, founded by Henry II. in expiation of the murder of Becket. The town of Loches presents narrow streets and ancient houses; it has a tribunal of first instance, a college, and 4581 inhabitants, who manufacture linen, coarse cloth, woollen yarn, and paper. *La-Haye-Descartes*, the birth-place of Descartes, is prettily situated on the right bank of the Creuse, and has 1459 inhabitants. *Ligueil*, W. of Loches, stands on the Estrigneuil, a feeder of the Creuse, and has 1929 inhabitants, who grow great quantities of plums. *Le-Grand-Pressigny*, on the right bank of the Claise, with a population of 1876; and *Preuilly*, further south on the same bank of the Claise, which has iron forges and 2264 inhabitants, give name to cantons.

The department forms the see of the Archbishop of Tours, is included in the jurisdiction of the Cour Royale and University Academy of Orléans, and belongs to the 4th Military Division of which Tours is head-quarters. Under the monarchy it returned 4 members to the Chamber of Deputies; it now has 8 representatives in the National Assembly.

(*Dictionnaire de la France;* Richard, *Guide Classique du Voyageur en France; Statistique de la France; Annuaire pour l' An* 1849.)

INDUCTION (Mathematics). The method of induction, in the sense in which the word is used in natural philosophy, is not known in pure mathematics. There certainly are instances in which a general proposition is proved by a collection

of the demonstrations of different cases, which may remind the investigator of the inductive process, or the collection of the general from the particular. Such instances however must not be taken as permanent, for it usually happens that a general demonstration is discovered as soon as attention is turned to the subject.

There is however one particular method of proceeding which is extremely common in mathematical reasoning, and to which we propose to give the name of *successive induction*. It has the main character of induction in physics, because it is really the collection of a general truth from a demonstration which implies the examination of every particular case; but it differs from the process of physics inasmuch as each case depends upon one which precedes. Substituting however demonstration for observation, the mathematical process bears an analogy to the experimental one, which, in our opinion, is a sufficient justification of the term 'successive induction.' An instance of the method will enable the mathematical reader to recognise a mode of investigation with which he is already familiar.

Example.—The sum of any number of successive odd numbers, beginning from unity, is a square number, namely, the square of half the even number which follows the last odd number. Let this proposition be true in any one single instance; that is, n being some whole number, let 1, 3, 5, ... up to $2n + 1$ put together give $(n+1)^2$. Then the next odd number being $2n + 3$, the sum of all the odd numbers up to $2n + 3$ will be $(n + 1)^2 + 2n + 3$, or $n^2 + 4n + 4$, or $(n + 2)^2$. But $n + 2$ is the half of the even number next following $2n + 3$: consequently, if the proposition be true of any one set of odd numbers, it is true of one more. But it is true of the first odd number 1, for this is the square of half the even number next following. Consequently, being true of 1, it is true of $1 + 3$; being true of $1 + 3$, it is true of $1 + 3 + 5$; being true of $1 + 3 + 5$, it is true of $1 + 3 + 5 + 7$, and so on, *ad infinitum*.

INDUCTION (ἐπαγωγή). According to Sir William Hamilton the word has been employed to designate three very different operations:—1. The objective process of investigating particular facts, as preparatory to Induction, which he observes is manifestly not a process of reasoning of any kind; 2. A material illation of a universal from a singular, as warranted either by the general analogy of nature or the special presumptions afforded by the object matter of any real science; 3. A formal illation of a universal from the individual, as legitimated solely by the laws of thought and abstracted from the conditions of any particular matter. The second of these operations is the inductive method of Bacon, which proceeds by means of rejections and conclusions, so as to arrive at those axioms or general laws from which we may infer by way of synthesis other particulars unknown to us, and perhaps placed beyond reach of direct examination. ('Nov. Org.,' 'Aph.,' c. iii. c. v.) Aristotle's definition coincides with the third, and induction 'is an inference drawn from all the particulars.' ('Prior. Analy.,' ii. c. xxiii.) The third alone is properly an induction of logic; for logic does not consider things, but the general forms of thought under which the mind conceives them; and the logical inference is not determined by any relation of causality between the premiss and conclusion, but by the subjective relation of reason and consequence as involved in the thought. The inductive process is exactly the reverse of the deductive; for, while the latter proceeds from the whole to the part, the former ascends from the part to the whole: since it is only under the character of a constituted or containing whole, or as a constituent and contained part, that anything can become the term of logical argumentation. Of these two processes Professor Hamilton gives the following figures:—

Induction.	Deduction.
X Y Z are A.	B is A.
X Y Z are whole B.	X Y Z are under B.
∴ whole B is A.	∴ X Y Z are A.
Or,	Or,
A contains X Y Z.	A contains B.
X Y Z contains B.	B contains X Y Z.
∴ A contains B.	∴ A contains X Y Z.

INDUCTION. [Advowson; Benefice.]

INDULGENCE is a power claimed by the Roman Catholic Church of granting to contrite and confessed sinners remission of the penalty which they ought to suffer here or hereafter in expiation of their sins. We may observe that indulgences are granted in some cases to those who give money for the building of churches and other pious purposes, but that the sale of or traffic in indulgences has been severely reprobated by many councils.

INDUS (the Indian), a constellation of Bayer, situated between Sagittarius and the South Pole.

INDUS. [Hindustan.]

INEQUALITY. (Astronomy.) For sake of convenience, the average motion of a planet or satellite, supposed to be made in a circle which has the average distance of the body from the sun or primary for its radius, is the first object of calculation when the place of the body at some future time is to be predicted. All the alterations which are rendered necessary by the unequal motion of the planet are called inequalities.

INERTIA. This word means something equivalent to the modern English sense of inactivity, or rather of incapability, and expresses that property of matter by which it does not change its own state of rest or motion, but requires for that purpose the action of some external cause, to the magnitude of which the change is in proportion. Previous to some remarks upon the use of this word, we shall give at length the third definition of Newton's 'Principia,' from which the common usage of it is derived. 'The *vis insita*, or innate force of matter, is a power of resisting by which every body, as much as in it lies, endeavours to persevere in its present state, whether it be of rest or of moving uniformly forward in a straight line. This force is ever proportional to the body whose force it is, and differs in nothing from the inactivity of the mass but in our manner of conceiving it. A body, from the inactivity of matter, is not without difficulty

put out of its state of rest or motion. Upon which account this *vis insita* may, by a most significant name, be called vis inertiæ, or force of inactivity. But a body exerts this force only when another force, impressed upon it, endeavours to change its condition,' &c.

We could wish that the use of this word were entirely exploded, and for the following reason. When a term is proposed to stand for a property, mode of being, or condition of existence, about which we know nothing except that certain phenomena always occur under certain circumstances, such a proposition may be listened to, on condition that there is one distinct phenomenon or class of phenomena which wants a distinctive name, and also on condition that the word is to be used in a purely characteristic, and not in a doctrinal or explanatory sense. Thus the word impenetrability, though likely to cause misconception, is nevertheless a good word to those who know how to use it, and a necessary word to those who desire to describe and reason on our knowledge of matter. It conveys to the mind, by one act of separation or abstraction, the notion of a cause for a phenomenon which might be conceived to exist independent of the other properties of matter. We can imagine impenetrable space, not endowed with mobility, colour, or any other accident of matter. But, with the word inertia as used by Newton, we do not describe any quality of matter, but supply a term of causation for matter itself, so far as those properties are concerned which are studied in mechanics. What is the matter of a work on pure statics or dynamics? That which obeys certain three laws of motion, or presents phenomena which are of a certain threefold description. What word, according to Newton, should be used as a term of causation to remind us that the first law of motion arises from something inherent in the constitution of matter? The inertia, or vis inertiæ. What for the second law? The inertia. What for the third law? Still the inertia. Consequently, this inertia is literally nothing but an expression of the incapability of matter to obey any other laws except those which it really does obey; and the policy of admitting such a term is not merely a question of mechanics. Need we accompany every fundamental term of every science by another, which merely expresses that there must be some reason why the thing signified has the collection of properties which it is found to possess, and not any other? We think the answer must be in the negative, in which case the word matter itself may be substituted for inert substance, the two phrases being perfectly interchangeable in every work on mechanics.

If the word Inertia be admitted at all as one of distinction, it must be to separate the object of geometry from that of mechanics. In the former we consider space only, that is, bounded portions of space: in the latter we suppose this bounded space to have inertia. But the distinction is quite sufficiently made without the introduction of a synonyme. In geometry we consider space without reference to the question, whether the space be vacuum or matter; in mechanics we consider matter.

Thus much for the use of Inertia in a scientific sense: in many popular writings we find it applied as a sort of explanation of the properties of matter, which are so and so because matter has inertia. Since this vicious application of words is not by any means confined to the case before us, it is needless to enlarge upon it.

INFAMY (from the Roman *Infamia*) in English law is not easily defined. Conviction and judgment for certain offences formerly rendered a person infamous, and incompetent to be a witness. But the endurance of the punishment, or reversal of the judgment, restored a man's competency as a witness. The 9 Geo. IV. c. 23, § 3, enacts that, when a man convicted of a felony shall have undergone the legal punishment for it, the effect shall be the same as a pardon under the Great Seal; and (§ 4) no misdemeanour, except perjury or subornation of perjury, shall render a man an incompetent witness after he has undergone his punishment. The 6 & 7 Vict. c. 85, enacts, that no man shall be excluded from giving evidence, though he may have been convicted of any crime or offence.

Certain offences enumerated in the 7 & 8 Geo. IV. c. 29, § 9, are infamous crimes, with reference to the provisions of that act. Though infamy does not now disqualify a man from being a witness, it may be urged as an argument against his credibility.

The only satisfactory definition of infamy would be a permanent legal incapacity to which a man is subjected in consequence of a conviction and judgment for an offence, and which is not removed by suffering the punishment for the offence. By 2 Geo. II. c. 24, § 6, persons who are legally convicted of perjury or subornation of perjury, or of taking and asking any bribe, are for ever incapacitated from voting at the election of members of parliament. They are therefore infamous: they labour under infamy: and have lost part of their political rights.

The Roman term Infamia is the origin of our term infamy. The rules of the Roman law as to Infamia are chiefly contained in the 'Digest,' iii. tit. 1 and 2; Savigny, 'System des heut. Röm. Rechts,' ii. § 76–83.

INFANT, a person under the age of twenty-one, whose acts are in many cases either void or voidable. As a general rule, an infant cannot make any contract, though to this there are some exceptions: thus an infant may bind himself to pay for his necessary meat, drink, apparel, physic, and such other necessaries, and likewise for his good teaching and instruction. (Co. Litt. 172.) But if an infant living in his father's house, and under his care, he is not liable even for necessaries.

By 1 Vic., 26, § 7, persons under age are incapacitated from making a will even of personal property, which before the passing of this act they were competent to do.

An infant, en ventre sa mere (in the womb), is for some purposes considered as a person, though the general rule is that the personality of a child does not begin until the child is separated from the mother in a living state.

INFANTICIDE. The practice of putting infants to death, or exposing them, has existed

many countries. Both in the Grecian states and among the Romans the exposure of infants was a common practice.

In China, or at least in some parts of the empire, a large proportion of the female population are put to death as soon as they are born. Among the Hindoos it was practised to a very great extent, till the Marquis of Wellesley, when appointed Governor-General of India, used every possible exertion to put a stop to it. His endeavours were successful, though for only a short time, for Bishop Heber observes that 'since that time things have gone on very much in the old train, and the answer made by the chiefs to any remonstrances of the British officers is, 'Pay our daughters' marriage portions, and they shall live.'' Among the Mohammedans the practice is not discountenanced, though the necessity for it is greatly lessened by the habit of producing abortion. In the numerous islands of the Pacific, infanticide is practised to such an extent that some of them have at times, when pestilence has contributed its influence, been nearly depopulated. One of the consequences of the introduction of Christianity and civilisation into heathen countries has been the decrease or cessation of this abominable custom.

Infanticide is common among the native tribes of Brazil. ('London Geog. Journal,' ii. 198.)

In Christian countries, although infanticide is regarded with the deepest abhorrence, and is visited with the extreme severity of the law, the expense and trouble of maintenance, and the fear of shame and loss of reputation, are motives sufficiently powerful for the occasional perpetration of the crime.

It is one of the most difficult questions of medical jurisprudence to establish the murder of a child lately born. The chief points for decision are,—1st, whether the infant, the subject of inquiry, was born dead or alive; and, 2nd, whether its death was the result of violence or of natural causes.

If the result of the evidence be that the child was born alive, and that it was destroyed, the offence is murder.

There are institutions in this country, as well as many other European countries, which have been founded with the view of restraining infanticide. [Foundling Hospitals.]

INFANTRY is a name given to the soldiers who serve on foot. Among the ancient nations of Europe the foot soldiers constituted the chief strength of the armies. In the best days of the Grecian and Roman states battles were mainly won by the force and discipline of the phalanges and legions, and the number of the infantry in the field far exceeded that of the cavalry. The ancient Franks fought on foot; and, in this country, the greater part of the Anglo-Saxon forces consisted of infantry. But soon after the time of Charlemagne the institutions of chivalry began to be generally adopted in the kingdoms of Europe; and, by degrees, the cavalry, which was composed of persons possessing rank and property, and completely armed, acquired the reputation of being the principal force in war; the foot soldiers, ill-armed and disciplined, were held in comparatively small estimation.

The infantry of this country, for some time after the Conquest, consisted of the yeomanry, vassals, and dependants of the feudal tenants; and occasionally foot soldiers were engaged by the kings, under indentures, to serve in the wars. Louis XI. of France formed a standing army of 10,000 French infantry, to which were joined 6000 Swiss; and subsequently Charles VIII. added a large body of Lansquenets, or German infantry. The reputation of the native troops in France was then at a low ebb, but the Swiss soldiers were inured to discipline; they were protected by defensive armour and formed into deep battalions, in which state they were able to render the shock of cavalry entirely unavailing.

The Spanish soldiery, probably from being almost constantly engaged in warfare with the Moors, had early acquired considerable reputation; and, subsequently, the great share which it had in the wars carried on both in Italy and Flanders, its steady discipline, and the success which resulted from the association of musketeers with pikemen in the battalions, caused the infantry of Spain to be considered, during many years, as the best in Europe. England, France, and Germany soon adopted the improvements introduced by the Spaniards; and it may be added that the practice of keeping up standing armies composed of men trained in the art of war under a rigid system of discipline, together with the universal adoption of the musket, has now brought all the infantry of Europe to nearly the same degree of perfection.

In the British army there are 99 regiments of infantry and 1 brigade of riflemen, besides the 3 regiments of Foot Guards, the regiments of Malta and St. Helena, the 3 West India regiments, and the rifle corps of Canada, the Cape of Good Hope, and Ceylon. There are also 23 regiments of infantry on service in the East Indies.

INFECTION is the contamination of the atmosphere or other inert substances by the deleterious or offensive qualities of malaria, the matter of contagion, effluvia from putrid animal or vegetable substances, &c. Some of these are at once recognised by the smell, or by chemical analysis, but the presence of others is known only by the diseases which they produce. The same means however may be applied in many cases for preventing the injurious effects of both classes.

The most important and valuable method of disinfection is ventilation, and, whatever other may be added to it, this should never be neglected. The reputation of chlorine, acids, lime, charcoal, &c., as disinfectants, depends on their property of decomposing the offensive gases which are so often mixed in the atmosphere with the matter of infection, but it is questionable whether they have any influence on the infectious particles themselves. However, as the emanations from putrid substances render the body peculiarly liable to the reception of infection, some of these means should be employed where any offensive smell is present. The best of these is chlorine, which may be applied in the form of chloride of lime, which

should be poured over anything from which odour is emitted; it should be sprinkled about the floor and on the walls; or shallow vessels containing it should be exposed to evaporate in the air; or pure chlorine should be disengaged in the form of gas from the materials from which it is manufactured. Dr. Henry has rendered it probable, by numerous experiments, that the infectious qualities of substances which cannot be conveniently washed, as trunks, packages of valuable merchandise, &c., may be sufficiently destroyed by exposing them to a dry heat of 200° for not less than an hour.

INFEFTMENT, in the law of Scotland, from the same origin as the English term feoffment, expresses the ceremony by which a person succeeding to another by descent, settlement, or conveyance, is invested in any heritable or real property. The cumbrous ceremony of infeftment was rendered no longer necessary by the 8 & 9 Vict. c. 35, passed 21st of July, 1845, and called 'An Act to simplify the form and diminish the expense of obtaining infeftment in heritable property in Scotland.'

INFEROBRANCHIA'TA, the third order of *Gastropods* in the system of Cuvier, who describes them as having nearly the form and organisation of *Doris* and *Tritonia*, but remarks that their branchiæ, instead of being placed on the back, are arranged in the form of two long suites of leaflets on the two sides of the body under the advanced border of the mantle. He records two genera, *Phyllidia* and *Diphyllidia*.

INFINITE, INFINITY, INFINITESIMAL CALCULUS. The word infinite is literally 'without bounds,' and when applied in an absolute sense to magnitude means that its quantity is utterly unlimited, so that there is no conceivable and determinable magnitude but what is less than the infinite magnitude.

The notion of infinity is therefore at first purely negative, but it does not long remain so: for we are forced upon what we take the liberty of calling a definite notion of infinity by our consideration of time, space, and number. We cannot, if we would, annihilate our conception of space, or confine it within certain limits; nor can we suppose duration to have an end. Even if we imagine our own annihilation, we cannot rid ourselves of the idea of something else existing, with the permanent conception of unbounded space and time. If we try to conceive all sentient existence at an end, we know from reasoning that we ought to suppose also the annihilation of space and time: but the constitution of our minds will not permit it, and as long as we exist to think, even about our own non-existence, the reality of space and time will prevent our conceiving their destruction.

The other extreme in the scale of quantity is the perfect absence of all magnitude, expressed in the word 'nothing' or the technical term 'zero.' It is necessary to treat the two together in mathematical reasoning, since all difficulties which belong to the one term belong equally to the other. We have also to consider the words 'infinitely small' as well as 'infinitely great.'

There are three distinct methods of proceeding in regard to the employment of these terms in mathematical reasoning. Firstly, we have those who would use the words 'infinite' or 'nothing' in their absolute sense, relying upon the reality of the conception which they have of the things signified by them. Secondly, there are others who would entirely banish the use of the words, because in their absolute sense they do not represent assignable magnitudes. Thirdly, others admit the use of the words, guarding them by definitions which point out the processes in the expression of the results of which they may be employed.

To the first it is answered that the absolute use of ∞ and 0 (the mathematical symbols of infinite magnitude and absence of all magnitude) in the same manner as symbols of definite quantity, is extremely liable to lead to error; which was never avoided by the advocates of this system, except by abandoning their theory, and applying in practice the maxims alluded to under the third of the preceding heads.

To the second of the three sects above mentioned it may readily be conceded that they have a right to refuse any branch of mathematical reasoning, so far as themselves only are concerned. But we deny that the code of mathematical controversy contains any such axiom as that 'mathematics is the science of assignable magnitudes only,' by which to claim the submission of an opponent. The general rule is, that mathematical demonstration exists wherever there is logical deduction from universally obvious maxims with respect to magnitude. Nor does the word 'universally' here mean that such maxims must have been obvious to every individual of the human race. If so, there would be no such thing as mathematical demonstration: for there have been found instances in which persons have denied that the sum of all the parts makes up the whole.

We proceed to enunciate the method followed by the third of the sects mentioned. If we look at the manner in which we derive the notion of infinity, we shall not find any one who imagines that he absolutely grasps infinite space, time, or number, by one single and independent conception of his mind. To space, space may be added; to this again space may be added; and so on without limit, until the space thus accumulated is greater than any definite space which was named at the outset of the process. From thence comes the notion of infinite: we cannot imagine the greatest possible space, because any space, however great being distinctly conceived, we can as distinctly conceive a greater. Consequently the phrase 'space is infinite,' whatever more it may imply, certainly may be allowed to stand for an abbreviation of the preceding two sentences. And in like manner, if we see a conclusion—which we can nearly attain by the use of a large magnitude more nearly by the use of a larger, and so on without limit, that is to say, as nearly as we please, if we may use a magnitude as large as we please, but which is never absolutely attained by any magnitude however great—then such conclusion may be said, for abbreviation, to

absolutely true when the magnitude is infinite. It may appear to some as if the conclusion, under the preceding circumstances, is really true when the magnitude is infinite: this may or may not be the case, but the mathematical use of the word infinite does not require the question to be raised. The convention under which that term is introduced demands that the preceding conditions shall be fulfilled, and excludes the word whenever they are not fulfilled: those who think that the fulfilment of the conditions makes that which we call a convention a necessary consequence meet on common ground with those who would reject the absolute notion of infinity. The former are allowed their own words, and their own result, together with their own method of arriving at it; the latter are not required to use the word infinite, except as an abbreviation: to the mere collocation of the letters which compose that word they can hardly object, and the conditions of its introduction are precise and intelligible.

Our explanation of the term infinite will readily show the meaning of the following assertion: Two infinitely great quantities may have a finite ratio, as follows:—when A and B are great, their ratio may be nearly, say, that of 10 to 7; when they are still greater, they may be still more nearly in that ratio, and so on; and their increase may be so regulated that the greater they become the more nearly is their ratio that of 10 to 7; or as nearly as you please, if they may be as great as we please. Similarly:—Two nothings may have a finite ratio. This means that A and B, both diminishing together, may diminish in such a way that when both are small their ratio may be nearly, say, that of 5 to 3; when they are still smaller, they may be still more nearly in that ratio, and so on: and their diminution may be so regulated that the smaller they become the more nearly is their ratio that of 5 to 3; or as nearly as you please, if they may be as small as we please.

But the idea of two nothings which have a finite ratio, however strictly defined in accordance with the preceding conditions, shocks even many of those who can grasp the method of using the word 'infinity.' The absolute nothing of subtraction has possession of the field, and it is not worth while to contest it for the use of a word. The term 'infinitely small' therefore supplies the place of 'nothing' whenever the latter is introduced under the conditions correlative to the conditions under which the use of infinitely great is allowed.

INFLAMMATION (from *inflammo*, to burn). When any part of the body is preternaturally hot, red, swollen, and painful, such a part is said to be inflamed, or in a state of inflammation; and when these symptoms prevail to a certain extent, or affect very sensible parts, that general constitutional disturbance called fever is excited.

Inflammation is said to terminate in three ways:—by resolution, suppuration, and mortification. By the first, which is the most frequent mode of termination, is meant a gradual subsidence of the swelling, a diminution of the heat, pain, and redness, and an abatement of the fever; the parts return to their natural size and colour, and no pus or matter is formed. Suppuration is said to have taken place when the inflammation goes on to the formation of pus; the swelling then becomes more prominent, of a shining red colour, and soft in the centre; if now no artificial opening be made, the matter obtains exit through one or more orifices produced by the absorption of the walls of the cavity in which it is contained, and the abscess, in popular language, is said to have burst. Mortification is the least frequent but most severe mode in which inflammation can terminate, and usually is productive of great constitutional disturbance; when it is the result of a high degree of inflammation, the attendant pain is exceedingly severe, the bright red colour of the part becomes livid, and vesicles form on its surface; complete death of the part then takes place, and the pain abates.

The treatment of inflammation consists in the removal of all exciting causes, the abstraction of blood generally and locally, the administering of such medicines as act either by lowering the circulation generally or increasing particular secretions, and in the employment of local emollient or sedative applications.

INFLORESCENCE, in plants, is the manner in which their flowers are arranged.

Inflorescence may be considered as regular or centripetal, and irregular or centrifugal; in the former all the parts are formed successively without interruption; in the latter the parts are subject to various interruptions and derangements in the progress of their formation. As examples of centrifugal inflorescence we may take the Elder, Laurustinus, &c.

The centripetal inflorescence, in its simplest state, is merely a branch bearing flowers instead of leaf-buds, as in the Hyacinth and the Ornithogalum: if the flowers are sessile, it is then called a *spike;* if stalked, a *raceme.* If the branch of the spike or its axis is so much contracted as to become a broad disk, as in the Dandelion, or Daisy, or common Artichoke, the inflorescence is called a *head* or *capitulum;* if the same thing happens to a raceme, the *umbel* of Astrantia, Fennel, Parsley, &c., is the result. Let the flower-stalks of the raceme be branched or racemose, and the *panicle* is produced. To these primary forms of inflorescence all others are referrible, as simple and generally unimportant varieties.

INFLUENZA is the name given by the Italians to an epidemic catarrh, which has spread more extensively than any other epidemic; and this universality of its attacks, together with the greater severity of its symptoms, principally distinguishes it from common catarrh. It attacks all ages and conditions of life, but is seldom fatal except to the aged, or to those previously suffering from or having a tendency to pulmonary disease. Notwithstanding the great frequency of this epidemic, it is remarkable how little variety there has been in its symptoms, and the records of cases which occurred in 1510 nearly resemble those which have been observed during its latest visitations. The following are the symptoms

which most generally characterise it:—The person is seized with slight chills, weight and pain, sometimes severe, are felt over the eyebrows, there is an increase of the lachrymal and nasal secretions, with loss of appetite, prostration of strength, a weak frequent pulse, dyspnœa, hoarseness, sore throat, and cough. The duration of the disease varies from one or two days to a fortnight, but great debility often remains behind for many weeks, and in some epidemics relapses have been frequent.

This disease, when once it has made its appearance, pursues a regular course from one country to another, from continent to continent, across seas and over mountains. It has often visited London with great severity. In 1729 it was very fatal in London; Lowe says more persons died of it than at any one time since the plague of 1665. In the month of September, 1729, 1000 weekly were carried off by it in the metropolis. In 1847 its fatality was also very great, considerably above 1000 weekly dying for many weeks together.

These epidemic visitations have taken place most frequently in the spring and autumn.

Mild aperients administered with caution, the exhibition of antimonial and saline medicines, and a cool temperature, constitute the means which experience has found to be most efficacious in the treatment of this disease.

INFORMATION (Criminal), a complaint exhibited before the Court of King's Bench, against a person for some misdemeanour. It differs from an indictment [INDICTMENT] principally in this, that an indictment is an accusation found by the oath of a grand jury, whereas an information is simply the allegation of the person who exhibits it. Informations are of two sorts: those which are partly at the suit of the king, and partly at that of a subject; and, secondly, such as are in the name of the king only. Informations, which are partly at the suit of the king and partly at that of a subject, are generally exhibited upon penal statutes, which impose a penalty on the offender, if he is convicted, one part of which is for the king and the other part for the informer.

Informations exhibited in the name of the king alone are either filed ex-officio by the king's attorney-general at his own discretion, when they are called ex-officio informations; or they are exhibited in the name of the king by some private person or informer, and are filed by the master of the crown office. Ex-officio informations are filed in the case of great misdemeanours which disturb the king's government, or interfere with the discharge of his kingly office. Those filed by the master of the crown office relate to riots, batteries, libels, which disturb the public peace, but do not directly tend to disturb the king's government. When any information is filed, it must be tried in the usual way by a petit jury in the county in which the offence was committed. (Blackstone, 'Com.' 307; 4 & 5 Will. and Mary, c. 18.)

When it is necessary for the court of chancery to interfere with the regulation or management of any charity, the attorney-general as informant, on the relation of some person (who is called the relator), files an information in the court of chancery for the purpose of bringing the case before the court. This is simply called an information.

INFUSIONS are solutions of some of the principles of vegetables, generally in water, but occasionally in other vehicles. When water is employed, it may either be hot or cold. It is customary to use warm water, but in many instances cold is preferable. Sometimes alcohol is added, after straining, to assist in keeping the infusion, or to increase its powers. Hard water should, if possible, be avoided in the preparation of infusions.

INFUSO'RIA. This title has been applied to the numerous minute animals found in water (and especially in water in which vegetable matters are contained), and to which the term *Animalcules* is commonly applied. From the invention of the microscope by Hooke may be dated the discovery of a new world of aquatic organic beings of such inconceivable minuteness, that, in the space of one cubic inch of water, more than 800,000 millions may revel in the enjoyment of their existence. There is not a drop of the ocean, of lakes, ponds, or rivers that does not teem with life, each drop perhaps containing nearly as many tenants as there are human beings on the surface of the globe. To Linnæus and the naturalists of his time the structure of these minute animals was not well understood; but from the recent improvements of the microscope and the diligent investigations of zoologists, among whom Hemprich and Ehrenberg claim a foremost place, our knowledge of these atoms of life is greatly improved, though much still remains for elucidation.

It is well ascertained that animalcules do not all belong to one group or class, in fact, not to the same zoological sub-kingdom. For example—Sub-kingdom *Nematoneura*, class *Rotifera*, or wheel-like animalcules, as *Brachioni*, *Notomata*, &c. Sub-kingdom *Arita*, class *Polygastrica*, as *Bursaria*, *Leucophrys*, *Monas*, &c.

The *Rotifera* derive their name from the appearance of wheels turning round and round near the mouth, or at the upper part of the body with great velocity. This appearance is deceptive, and is found to arise from circlets consisting of minute cilia, which in rapid succession bend and unbend, producing the effect sometimes of waves chasing each other in a ring, at other times of wheels in rapid whirl. These cilia are sometimes quiescent, sometimes only partially agitated. They propel the microscopic beings through the water, and moreover serve for the acquisition of food. Fixing itself by means of caudal forceps to any object, the animal throws its cilia into violent action producing a whirpool in the contiguous water, whereby minute particles of animal or vegetable matter are drawn to the mouth. Some of the Rotifera (*Nuda*) are naked, others (*Loricata*) are covered with a delicate transparent horny or calcareous tunic, through which the internal viscera may be seen. The Rotifera are oviparous, possess a distinct digestive apparatus, and are very active and alert.

The *Polygastrica*, or many-stomached animalcules, abound in the sea and fresh waters. They are divisible into two groups; one distinguished by the soft or shell-less condition of the body

the other by the body being more or less protected by an extremely fine and transparent shell, varying greatly in form in different species. Some of the Polygastrica present wonderful changes of form, and seem as if they had no definite or settled configuration. They are evidently endowed with instinct; they know how to pursue their food, what to take, what to reject, and how to avoid danger: the larger make the smaller their prey. The minutest of these animalcules which the finest microscopes have brought within our vision are termed Monads. With respect to organs of locomotion, some make for themselves at will arms or paddles by shooting forth portions of their body; others are furnished with vibratile cilia; but in some no especial organs of locomotion can be discerned. Acccording to Ehrenberg the digestive apparatus consists of a mouth leading to a number of internal sacculi, or stomachs, variously arranged in different species.

Reproduction is by buds, by spontaneous division, and by eggs.

INFUSO'RIA, FOSSIL. The geographical distribution of living infusoria corresponds in extent with the abundance of reproduction, and the facility of diffusion through water and air, which belong to these microscopic creatures. Frequent in all the varieties of water which have been exposed to air and light, and in all the conditions of this element between the extremes of terrestrial temperatures, not absent even from snow, ice-covered streams, or the ejections of volcanoes, they have been recognised in all the regions of the globe. Lakes, rivers, and the sea are in places richly replenished by them, and their silicious integuments falling through the water accumulate into extensive deposits. In regard to such accumulations in the sea, we have the evidence of soundings by Captain Sir J. Ross in the course of the antarctic voyage ('Annals of Nat. History,' Oct. 1845) and Ehrenberg's examination of the deposits of Cuxhaven; and their abundance in fresh waters is matter of universal occurrence. These deposits consist of the silicious integuments of the infusoria; and, as only a small proportion of the families are protected with silicious coverings, and as the waters which nourished them contain but little silica, while the deposits are very extensive, we naturally associate with these facts the idea of long-elapsed time.

But, on turning to the marine and fresh-water deposits of earlier date, this impression of the long duration of natural agencies becomes much heightened. When, conducted by Ehrenberg, we find beneath the Bohemian mountains, and in the plains of North Germany, pleiocene deposits many feet in thickness, composed of little else than the thin flinty loricæ of microzoaria, and, following Professor Rogers and Mr. Bailey, who dug up myriads of other forms from the meiocene strata of Virginia, while Mantell and Reade exhibit to us infusoria from the chalk and the Kimmeridge clay of England, we must add to the historic time during which it can be proved these animalculæ have lived the large indefinite geological periods of Cainozoic and Mesozoic formations.

The source of the silicious matter which enters into the organisation of the infusorial races is not difficult of discovery. Most of our fresh waters contain silica, though not in abundance, derived, it is probable, from the decomposition of felspar and other mineral silicates. Silicate of soda and silicate of potash, thus occasioned, may by intermediate vegetative processes yield the silica in a state suitable for being organically solidified. Experiments on this subject, which may be easily made, are quite satisfactory in showing that myriads of silicated infusoria (Brachioni) may be generated in a few days in a sandstone trough, supplied with water and decaying vegetation. The animalcules being dried on the field-glass of the microscope, their beautiful transparent silicious loricæ remain in abundance. In the hot waters of volcanic foci, silica is dissolved abundantly, and it is necessary to keep this fact in view while considering the extensive flint beds in chalk, the thick Polierschiefer beds of Bilin, and other silicious masses, the result of organisation. The distinction of *marine* and *fresh-water races*, which runs through all the larger animals and plants with such regularity as to be termed a law of nature, obtains also, but less absolutely, in the infusoria. Some species live both in fresh and salt water, and many at the junction of rivers with the sea. By comparing the living oceanic and lacustrine races on a large scale, enough of difference appears in their silicious shields to authorise conclusions more or less positive as to the marine or fresh-water origin of infusorial deposits which contain identical or analogous forms belonging to earlier periods. Thus the rich deposits of Richmond in Virginia appear to have been formed beneath the sea; the famous deposits of Bohemia, Berlin, and Santa Fiora contain admixtures of marine and fresh-water tribes; while those of Bann, in the county of Down, and Gainsborough and Bridlington, contain a more considerable proportion of fresh-water species.

Infusorial remains are very unequally congregated. The silicious marl of Franzenbad consists chiefly of *Navicula viridis;* that of the Isle of France, of *Bacillaria vulgaris;* that of San Fiora, of *Synedra capitata;* while that of Billin is composed of *Gaillonella distans* almost exclusively.

INGA, a genus of plants of the natural family of *Leguminosæ*, which, though it has been separated from *Mimosa*, still contains upwards of one hundred species. These are found in the tropical parts of Asia, Africa, and America. A few of the useful species have been further separated into the genus *Parkia;* but many still remain which are important in the countries where they are indigenous, either for astringent properties, like many Mimosas and Acacias, or for the edible nature of the fecula or pulp which surrounds their seeds.

INGENHOUSZ, JOHAN, a distinguished natural philosopher, was born in 1730 at Breda, and for some years practised medicine in that city. He afterwards came to London, where his discoveries in chemistry and electricity led to his being elected a Fellow of the Royal Society in 1769. He practised as a physician in London,

and his reputation was such that he was sent for to Vienna, by the Empress Maria Theresa, in 1772. He afterwards visited Italy and France, and after an absence of several years returned to England, where he continued to prosecute experiments in electricity, chemistry, &c. An account of an electrophorus, which he had invented, is described in the 'Philosophical Transactions' for 1778. About the same time he made the discovery that plants exposed to the light while growing discharge oxygen gas from their leaves into the atmosphere; and an account of his researches relating to this subject was published in London in 1779, under the title of 'Experiments upon Vegetables, discovering the power of purifying the Air in the Sunshine, and of injuring it in the Shade,' &c.

In the 'Philosophical Transactions' for 1779, there is an account of an electrical machine which, about that time, Dr. Ingenhousz had constructed. This probably led to the invention of the plate electrical machine, which is generally ascribed to Ingenhousz. He published in English a work entitled 'New Experiments and Observations concerning various Physical Subjects;' and another work in French, entitled 'Essai sur la Nourriture des Plantes,' which was translated into English and published in London in 1798.

Dr. Ingenhousz died Sept. 7, 1799, at his residence near London.

INGOLSTADT. [Regen.]

INGOUVILLE. [Havre.]

INGULPHUS, the author, or supposed author, of a work entitled 'Historia Monasterii Croylandensis' (the History of the Monastery of Croyland, or Crowland, in Lincolnshire), was born in London about the year 1030, and was educated, first at Westminster, and afterwards at Oxford. He was introduced to Duke William of Normandy when that prince visited the court of Edward the Confessor in 1051, and he made himself so acceptable to William, that he took him with him on his return to the continent, and made him his prime-minister. However, after some years he relinquished this situation to accompany Sigfrid, duke of Mentz, on a pilgrimage to the Holy Land. On his return, Ingulphus became a monk in the abbey of Fontenelle in Normandy. Here he remained till 1076, when he came over to England on the invitation of William the Conqueror, and was appointed abbot of Croyland. Here he resided till his death, Dec. 17, 1109. The history of Croyland, the only work claiming to be his now extant, was first printed in an imperfect form in Sir Henry Savile's 'Rerum Anglicarum Scriptores post Bedam Præcipui,' fol., London, 1596; it was printed entire, along with the continuation by Peter of Blois, in the 'Rerum Anglicarum Scriptorum Veterum Tomus Primus,' fol., Oxon., 1684. A very formidable attack was made upon its claims to be regarded as anything better than 'an historical novel,' a mere monkish invention or forgery of a later age, by Sir Francis Palgrave, in an article in the 'Quarterly Review' for June 1826 (No. 67).

INJUNCTION. An injunction is a writ which issues by the order and under the seal of a court of equity, and is of two kinds, remedial and judicial.

The remedial writ is used for the following purposes among many others: to restrain parties from proceeding in other courts, from negotiating notes or bills of exchange, to prevent the sailing of a ship, the alienation of a specific chattel, to prevent waste by felling timber or pulling down buildings, the infringement of patents or copyright, to repress nuisances, and to put an end to vexatious litigation. The writ of injunction is useful in stopping or preventing wrongs for which the ordinary legal remedy is too slow.

The judicial writ of injunction is virtually abolished by the Statute 11 Geo. IV. and 1 Wm. IV. c. 36, § 11.

INK consists of several varieties.

Writing Ink.—The writing ink of the ancients was essentially different from that which is now employed. Its basis was finely divided charcoal, mixed with some mucilaginous or adhesive fluid: it was much less destructible than modern writing ink, and somewhat more resembled printers' ink. Writing ink is now a chemical compound, and not a mere mechanical mixture. Its basis is proto-gallate and proto-tannate of iron, which by oxidisement become per-gallate and per-tannate; and it is owing to the oxygen of the air effecting this change gradually that recent writing is of a comparatively light colour, and that it subsequently becomes black.

Many processes have been given for preparing writing ink. The common ingredients are galls and sulphate of iron; in fact, while printers' ink may be considered as a black paint, writing ink may be regarded as a black dye. We shall not copy the different modes which have been adopted. The following, which is recommended by Mr. Brande, gives, he says, an excellent ink, and it possesses the merit of greater simplicity than most others:—Aleppo galls, bruised, 6 ounces; sulphate of iron, 4 ounces; gum arabic, 4 ounces; water, 6 pints. Boil the galls in the water, then add the other ingredients, and keep the whole in a well-stopped bottle, occasionally shaking it. In two months strain and pour off the ink into glass bottles, to be well corked. To prevent mould add one grain of corrosive sublimate, or three drops of creasote, to each pint of ink.

Modern writing ink, unlike the ancient, is readily destroyed by chlorine, acids, and alkalis.

Red, blue, and other coloured inks have nearly the same chemical properties as black ink, and depend for their colour on the kind of ingredient employed.

Indian Ink.—The cakes of this ink are made of lamp-black and size, or animal glue, with the addition of perfumes or other substances not essential to its quality as an ink. It is used in China with a brush, both for writing and for painting upon paper of Chinese manufacture. It is used in Europe for designs in black and white, in which it possesses the advantage of affording various depths of shade, according to the degree of dilution with water.

Printers' Ink is of two kinds: for letter-press printing and for copper-plate printing. Printers'

ink is prepared by boiling linseed or nut oil in an iron pot; and, if it does not take fire of itself, it is kindled, and suffered to burn for about half an hour; the flame is then extinguished by closely covering the vessel, and the oil is by this operation found to have acquired the necessary drying quality, after being again boiled. It is then mixed with a proper quantity of lamp-black, when black ink is required; if red ink be required, the colouring matter employed is vermilion, for finer works. Copper-plate printers' ink is made with oil which is less boiled, and the charcoal used is stated to be Frankfort black, made from vine twigs.

Marking Ink is employed for marking linen: it is a solution of nitrate of silver, written with a pen upon the fabric to be marked after it has been moistened with an alkaline solution, as potash or soda. By this process oxide of silver is precipitated upon and combines with the cloth so as to be scarcely removeable by any reagent which does not also destroy its texture.

Sympathetic Inks are such as are invisible until heat is applied, and then, by the chemical change induced, the writing becomes visible. The most remarkable of these is that prepared from cobalt, called Hellot's Sympathetic Ink, which is a chloride of the metal. When the written paper is held to the fire so as to evaporate the water, the letters become green.

INN. An innkeeper is responsible for the safety of the goods of persons who use his house; but he may be released from his liability either by inattention on the part of the guest to such reasonable rules as the innkeeper may lay down for the protection of the property of his guests; by any act of negligence on the part of the guest himself; or by his making use of the house not *causâ hospitandi*, that is, not for the purpose of using it as an inn. Thus, if an innkeeper requires his guest to put his goods under lock and key, and the guest leaves them in a passage, whereby they are lost; or the goods are stolen by the guest's own servant; or the guest uses his room in the inn as a show-room, into which a number of people are allowed to have access, and not as a lodging-room, the responsibility of the innkeeper ceases. The Roman law on this subject is contained in the 'Digest,' iv., tit. 9.

(Smith's *Leading Cases*, 'Calye's Case.')

INN, River. [Austria.]

INNOCENT I. and II. [Pope.]

INNOCENT III., Cardinal Lotharius, son of Trasimund, count of Segni, was unanimously elected in 1198, after the death of Celestine III. He ascended the papal throne at the age of thirty-seven. He had distinguished himself while at the universities of Paris and Bologna in the studies of philosophy, theology, and the canon law, and also by several written compositions, especially by his treatise 'De Miseria Conditionis Humanæ.' The object at which Innocent aimed was universal supremacy. External circumstances favoured his views. In Sicily he assumed the regency during the minority of Frederick II. At Rome, availing himself of the vacancy of the imperial throne, he bestowed the investiture on the prefect of Rome, whom he made to swear allegiance to himself; he drove away the Imperial feudatories, took possession of those provinces in the name of the Roman see, and formed a league with Tuscany against the empire. In Germany he first deposed, and then excommunicated, Otho, and secured the crown for his own ward Frederick of Sicily. Calo Johannes, prince of the Bulgarians, acknowledged his allegiance to the Roman see, and Leo, king of Armenia, received Innocent's legates, who bestowed upon him the investiture of his kingdom. Innocent excommunicated Svercum, who had usurped the kingdom of Norway, and also Philippe Auguste of France, because he had repudiated his wife Ingerburga of Denmark, and had married Agnès de Meranie. The King of Leon, having married his cousin, the daughter of the King of Portugal, was likewise excommunicated, and, as he would not submit, Innocent laid both kingdoms under an interdict.

He also laid the kingdom of England under an interdict in consequence of a dispute with King John, who eventually not only declared allegiance and paid him tribute, but surrendered the kingdoms of England and Ireland to the Pope and his heirs for ever. Against those who separated themselves from the body of the Roman Church, Innocent was stern and uncompromising. His persecution of the Albigenses is memorable for its malignity. He died in 1216. His pontificate must be considered as the period of the highest power of the Roman see.

INNOCENT IV., V., VI., VII., VIII., IX., X., XI., XII., XIII. [Pope.]

INNS OF COURT AND OF CHANCERY. When the houses of law were first established seems very doubtful; but the fixing of the Court of Common Pleas at the palace at Westminster brought together a number of persons who (as Spelman says) addicted themselves wholly to the study of the laws of the land, and, no longer considering it as a mere subordinate science, soon improved the law, and brought it to that condition which it attained under King Edward I. They purchased at various times certain houses between the city of London and the palace of Westminster, for the combined advantage of ready access to Westminster, and of obtaining provisions from London.

The inns of court, as they are now called, are Lincoln's Inn, the Inner Temple, the Middle Temple, and Gray's Inn.

The Inner Temple, as well as the Middle Temple, owes its name to the Knights Templars. After the dissolution of that order, it was granted to the Knights of St. John of Jerusalem by King Edward III., and was soon after, according to Dugdale, demised by them to 'divers professors of the common law that came from Thavye's Inn, in Holburne.' The church, which is common to both societies, was founded by the Templars, upon the model of that of the Holy Sepulchre at Jerusalem, and was consecrated in 1185, and dedicated to the Virgin Mary. This church has been recently restored and beautified.

Besides these four inns of court there are eight inns of chancery, which are now only used

as chambers, and are principally inhabited by solicitors and attorneys. Two belong to Lincoln's Inn, namely, Furnival's Inn and Thavye's Inn. Four belong to the Temple, Clifford's Inn, Clement's Inn, New Inn, and Lyon's Inn. Staple Inn and Barnard's Inn belong to Gray's Inn.

Each inn of court is governed by its own benchers, who fill up the vacancies of their own body. The benchers of each inn exercise the power of calling to the bar the members of their own inn. [BARRISTER.] They also exercise the power of disbarring a barrister that is, depriving him of his degree of barrister, if they see sufficient reason for such a proceeding.

INNSBRUCK, or *Innspruck*, the capital of the Tyrol, is situated on the Inn, near the point where that river is joined by the Sill, in 47° 16′ N. lat., 11° 23½′ E. long., 245 miles W. by S. from Vienna, and has 13,000 inhabitants. The town is built in a most beautiful situation, in the middle of the valley of the Inn, which is hemmed in on both sides by mountains varying from 6000 to 8000 feet high. It takes its name of Innsbruck (Inn's Bridge) from the wooden bridge which spans the river, and on and near which the Tyrolese, under Hofer, after a fierce action, succeeded in repulsing the French during the war of independence. The town is in general well built; many of the houses are in the Italian style, the basement story consisting of arcades, which are occupied as shops. The street of Neustadt is the finest; here are the Landhaus or Tyrolese parliament house, the post-office, and, at its southern extremity, a triumphal arch erected by the Empress Maria Theresa. Among the public buildings, the most interesting is the Franciscan church, which contains the tomb of Maximilian I., the most splendid monument of the kind in Europe, and the Silver Lady-Chapel; the 28 bronze statues that form part of the plan of Maximilian's tomb, and represent some of the worthies of Europe, including the most distinguished personages of the house of Austria, were cast by Tyrolese artists; the bas-reliefs on the tomb, and in the lady-chapel, which are masterpieces of art, are the work of Collin of Mechlin. On the left of the entrance to this church is the grave of Hofer, which is surmounted by a statue of the hero in Tyrolese white marble. The other remarkable buildings are—the palace built for Maria Theresa in 1770, in the court-yard of which is an equestrian statue of Leopold V.; the university, in which is the Museum Ferdinandeum, rich in Tyrolese minerals, fossils, and works of art; the Capuchin church, in which is the penitential cell of Maximilian II.; the richly decorated church of St. James (Jacob's Kirche); the old palace of the counts of Tyrol; and the Fürstenburg, in which is the famous golden roof (goldene dach), a sort of oriel window, covered with a roof of gilt copper, which projects in front of the building. The public cemetery (Gottes-acker) contains some fine monuments. The Schiesstadt, where the Tyrolese practise rifle-shooting, is in a very pretty situation on the left bank of the Inn, on a slope of the Berg-Isel, and is well worth visiting. The market-place of Innsbruck presents a very interesting appearance, from the great variety of picturesque costumes worn by the inhabitants of the different valleys, who frequent it. Eilwägen (quick-travelling vans) run daily to Salzburg, Vienna, and Munich, and two or three times a week to Italy, by the roads over the Brenner and the Stelvio. The chief manufactures of the town are silks, gloves, calico, ribands, glass, and wood and horn carved work; there is also an important transit trade. The neighbourhood abounds with beautiful scenery and charming promenades. Innsbruck is the seat of the supreme court of justice for the whole of the Tyrol.

INOCULATION is the insertion of morbid fluid formed in the body of one person into that of another. It has however been more particularly applied to the practice of producing small-pox by removing a small quantity of the fluid formed in the pustular eruption on the skin of one person, and inserting it beneath that of another. The disease is much mitigated by this process. The practice was introduced into this country by Lady Mary Wortley Montagu, about the year 1721, her son having thus received the disease during her residence in Constantinople. It had long been practised in Turkey and other Eastern countries. It was very slowly adopted in this country, and it was not until it had been practised on six criminals (whose liberty was promised to them if they recovered, as they fortunately did) that it was generally received. It was then almost universally had recourse to, till the introduction of vaccination, by which it has been superseded.

INOCULATION, in Horticulture, is only another name for the operation called budding. [BUDDING.] The season for performing the operation is, generally speaking, from the beginning of July to the middle of August, the particular time varying according to the season. The best criterion is the state of the buds and the degree of cohesion between the bark and alburnum of the stock. If the buds on the young shoots have become so far perfectly formed outside as to bear separation from the branch, and if the bark of the stock can be freely raised, and exhibits an abundance of cambium in a fluid state, the operation may be proceeded with. If, on the contrary, the bark adheres rigidly to the alburnum, or is *set*, as it is technically expressed, there is little chance of success. The operation of budding, or inoculation, is performed in various ways; but the best and most general is that called shield-budding or T budding, from the resemblance of the two cuts made in the bark of the stock to the two principal bars of the Roman letter T.

INQUEST, INQUISITION. [CORONER.]

INSANITY, mental alienation, lunacy, &c. The variety of the forms of insanity is almost endless, but they may conveniently, for the purpose of descriptions be collected under the following heads:—

1. The first principal form constitutes what is termed 'moral insanity' by Dr. Prichard, who describes it as 'consisting in a morbid perversion of the feelings, affections, and active powers without any illusion or erroneous conviction in

pressed upon the understanding, sometimes co-existing with an apparently unimpaired state of the intellectual faculties.' The character of the affection varies with the degree in which the different feelings are affected. Sometimes jealousy and suspicion are the prevailing passions; sometimes fear and apprehension of some undefined danger or misfortune. These states are generally marked by depression, but they are not unfrequently interrupted by fits of violence and preternatural excitement of short duration. An inordinate degree of pride and vanity is often the prevailing characteristic of the feelings of a disordered mind; and it is generally attended with some delusion. A propensity to mischief, and to destroy all surrounding objects, is not uncommonly displayed by the insane. Another degree of the same affection is the impulse to the destruction of life.

2. The term *Monomania* has been proposed by M. Esquirol, and adopted by most writers on mental disorders, to designate those cases of insanity in which the mind is occupied by some illusion or erroneous conviction, the individual still retaining the power of reasoning correctly on matters unconnected with the subject of his delusion. The word *Melancholia* has been used in the same sense, which has given rise to the erroneous notion that insanity of this kind is necessarily of a gloomy character. It rarely happens that the mind of the monomaniac is otherwise perfectly sound; there is generally combined with the delusion a morbid state of the moral feelings, and in many instances a great weakness of the reasoning faculty. The subject of the delusion is very various. It may have reference to the condition of the individual's own person. Thus, some fancy that they have lost their head, others that their legs are not their own, but belong to some other person, others again that they have the devil or some animal within them, that they are dead, or that they are changed to some other form, &c.

4. Mixed forms of madness are by far the most frequent. Moral insanity, the disturbance of the moral feelings, is generally attended with some degree of weakness of the reasoning powers, or with some delusion.

5. When the disordered state of the mind is much protracted, it usually terminates in loss of the intellectual faculties. The state of imbecility, dementia, or fatuity, which then succeeds has many degrees, from a loss of power in one or more of the faculties of the mind, to the almost total destitution of the intellectual and moral powers. This may occur without interfering with those functions of the body on which mere existence depends.

The chance of recovery varies very much according as the insanity is complicated or not with other disease; it is also influenced by the form of the disease, the period of its course, the age, sex, and constitution of the patient. The mean duration of cases terminating favourably seems to be from five to ten months. The age most favourable for recovery from insanity is the period from the twentieth to the thirtieth year; few recover after the fiftieth. Insanity is generally more curable in women than men. It is extremely rare in uncivilised nations, as among the natives of Africa and America.

The principal means of checking insanity are—1, the prevention of the marriage of individuals predisposed by inheritance to the disease; 2, the improvement of the physical condition of the poor; 3, the encouragement of intellectual cultivation and amusements among the lower classes, as a means of checking intemperance and sensual indulgence generally; 4, a better education of the moral feelings in all classes of society, so as to discipline the passions and enable the mind to resist their disturbing influence.

The treatment of insanity resolves itself into the medical and the moral. The medical treatment indicated and required at the commencement of the disease consists chiefly in the attempt to reduce increased vascular excitement or slight inflammatory action. A strengthening diet is requisite in some cases; cleanliness, fresh air, and exercise, in all cases.

The moral treatment is a most important part of the management of the insane, in carrying out which the chief means adopted are the following:—1. In many cases seclusion from society, chiefly with a view to remove the patient from the influence of the circumstances which produced the disorder. 2. Occupation and amusement of the mind in various ways, so as to divert the thoughts; this is an important circumstance in the treatment, and has been only recently attended to. 3. The moral influence of the physician has a powerful effect on the mind of the insane; kindness will gain their confidence, while a firm though mild manner is often sufficient to restrain the most violent outbreaks of rage, and render other means of restraint unnecessary. Chains are now generally discarded from the apparatus of the lunatic asylum, and even strait waistcoats and straps are seldom required. 4. The convalescent should be separated from the other patients in the asylum. 5. The insane should be classified, so as to separate the quiet and timid from the noisy and violent.

INSECTA, or INSECTS, invertebrate animals of the homogangliate or articulate sub-kingdom, having the body divided into three portions, whence their title. [Entomology.] Insects are in general covered with a horny or coriaceous integument, serving as an external skeleton; they possess, when mature, three pairs of legs; they are capable for the most part of flight, having two or four wings. The sexes are distinct, the females oviparous; they undergo, as a common rule, three transformations from the egg to maturity. Eyes compound, with additional simple eyes or stemmata in certain groups. Circulation effected by a pulsating dorsal vessel, provided with numerous valves. Respiration by tracheæ, which form two lateral trunks, and ramify through the body.

Insects fly, walk, leap, swim, dive, mine into the earth, bore into wood, build structures which fill our minds with astonishment, and in various ways exhibit the possession of marvellous instinctive faculties, insomuch that many of their proceedings appear to be the result of profound reasoning. They furnish us with silk, wax, honey, lac,

cochineal, and gall-nuts. Some are eaten by various tribes of men; and they furnish food to mammalia, birds, reptiles, and fishes, and to the carnivorous of their own class.

Some are remarkable for beauty, for splendour of colouring, for gracefulness, and delicacy; others surprise us by the strange singularity of their forms, and others again by their natural lantern, which gleams brilliantly in the hours of darkness.

If we place an insect before us, we shall find that it is divided into three distinct parts; the head (caput); the thorax; and the abdomen.

The principal parts of the head are termed respectively the *clypeus* or *nasus;* the *vertex;* the *occiput;* the *genæ*, or *cheeks;* the *canthus;* the *gula*. To the head belong the two compound eyes, the simple eyes, or *stemmata*, when present; the antennæ, and seven portions of the mouth called *tropki*.

The mouths of insects are either mandibulate, formed for biting, or haustellate, formed for suction.

In a mandibulate mouth, the seven portions, collectively termed *trophi*, consist of a *labrum*, or upper lip; a *labium*, or under lip; two *mandibulæ*, or jaws; two *maxillæ*, or under jaws; and a *lingua*, or tongue. To the maxillæ are attached a pair of feelers called *maxillary palpi;* and a similar pair are also attached to the labium, or under lip; these are the *labial palpi*. The *labrum* is usually moveable, and articulated to the clypeus, terminating the head anteriorly; it is opposed to the *labium*, and their joint use appears to be to keep the food in its proper place, while the jaws work upon it. The *labium* is divided into three portions; the *palpiger*, the *mentum*, and *stipes*. The labial palpi generally consist of two articulations, exclusive of their basal attachment. The *mandibulæ* or mandibles are used for seizing and biting; when viewed from above or beneath, they generally present a figure more or less approaching to a triangle; are externally convex, but internally concave, the concave surface being furnished with serrations, or tooth-like processes. As mandibulate insects vary in their food, some being frugivorous, others granivorous, others herbivorous, others lignivorous, and others again carnivorous, there is great variation in the form and development of the *mandibulæ*.

With respect to the *maxillæ*, or under jaws, it may be observed that, exclusive of the maxillary *palpus*, each *maxilla*, besides its true and effective part, or *lobus inferior*, has an appendage sometimes rudimentary, sometimes wanting, but often composed of two or three joints, and resembling an additional *palpus*. The *maxillæ* appear to assist in turning the food about during the operation of the mandibles. The basal joint of the *maxillæ*, on which it moves, is called the *cardo*, or hinge. The tongue is situated within the *labium*, or lower lip, and sometimes emerges from it. In many cases it constitutes an organ for the collecting of food, which it transmits to the gullet. For an account of the antennæ of insects see ANTENNÆ.

Now, however different the mouths of haustellate insects may be from the mouths of mandibulate insects, still the difference is one of modification only. The parts are the same, but newly fashioned and proportioned. Indeed, among the *mandibulata* we find a remarkable modulation in the mouth of some insects, as the bee, which laps the honey of flowers. In the bee and its allies, the mandibles are large and powerful; the labrum varies in shape, but is distinct. The maxillæ are elongated, and modified into a sheath for the tongue, and are affixed to the mentum, or base of the labium, with small palpi. The labium is elongated, and articulates with the tongue, which is carried from it. The tongue, which in most mandibulate insects is short, is long and slender in haustellate insects. The labial palpi have four joints, the most which these organs ever have, and they are remarkable for exceeding in length the maxillary palpi, which are ordinarily the longest. The first two joints are compressed, and set on below the apex of the second joint. The tongue moreover is sheathed at its base with two membranous appendages, found also in predacious beetles, and termed *paraglossæ*. The upper part of the tongue is cartilaginous, and remarkable for a number of transverse rings; it is moved by numerous muscles. Below the middle is a membrane longitudinally folded when not in use, but capable of being distended to a considerable size; this membranous bag receives the honey which the tongue laps from the flowers.

As examples of the haustellate insects, in which the mouth is modified for suction, we may mention the Butterfly, the Aphis, the *Cimex lectularius*, the Flea, the Fly, the Tabanus, the Gnat, Mosquito, &c. The vast variety of modifications presented by the suctorial mouth of haustellate insects are fully detailed in Kirby and Spence's 'Entomology.'

The *thorax* is composed of three segments consolidated together, respectively named *prothórax*, *mesothorax*, and *metathorax;* these terms however rather apply to the upper than the under surface, for the under part of the *prothorax* is called *prosternum*, of the *mesothorax*, *mesosternum*, and of the *metathorax*, *metasternum*. The prothorax carries the first pair of legs, the mesothorax the second pair, and the first pair of wings, or in their place the wing-cases (*elytra*); the metathorax supports the third pair of legs and the second pair of wings. Dipterous insects, which have only two wings, are furnished with *halteres*, or poisers, and above them a little scale or winglet (*alula*), the use of which is not very clear.

The *limbs*, variously modified for running, leaping, swimming, burrowing, and even for adhesion by means of suckers, to panes of glass, the ceiling of rooms, &c. (as we see in the common fly), consist of five principal parts, viz. the *coxa*, or hip next to the body; the *trochanter;* the *femur* or thigh; the *tibia*, or shank; and, lastly, the *tarsus*, or foot, never composed of more than five joints, and often ending in two hooked claws called *unguiculi*, in addition to suckers.

The abdomen consists of nine segments. The respiratory spiracles, or *stigmata*, are disposed in regular succession along the sides of the thorax and abdomen; the aerating tubes ramify throughout the body, and run along the nervures of the wings.

The digestive system of insects is well developed, and consists of an intestinal canal, in which a crop, gizzard, stomach, and small intestine are generally distinct; and, as in the higher orders of animals, these parts vary according to the nature of the food.

Insects are either *ametabolous*, or *metabolous*. In the former the larva resembles the perfect insect, yet it wants wings if the perfect insect be winged; the pupa in this case has their rudiments; it runs about and eats. The Cockroach is a familiar example of an *ametabolous* insect; so is the Water-Boatman (*Notonecta*), and so are Crickets, Grasshoppers, Locusts, &c. Under this section Burmeister places three orders, viz. *Hemiptera*, *Orthoptera*, and *Dictyoptera*, which latter might be incorporated with the preceding.

In *metabolous* insects the larva consists of thirteen segments, either with or without legs; the pupa is inactive, or, if it moves, it takes no food. To this section belong Beetles, Butterflies, Moths, Flies, Gnats, &c.

The larvæ of many insects, as the Gnat, the Dragon Fly, &c., are aquatic in their habits, but furnished with an apparatus which enables them to respire air. Some weave cocoons of silk, some bury themselves in the earth, and some suspend themselves in order to pass through the pupa state.

The legs of larvæ, or caterpillars, are divided into two series, viz. the *true*, or *persistent*, and the *prolegs*, which are temporary. The true legs consist of three pairs attached respectively to the first three segments of the body, which constitute the future thorax. The prolegs are soft, short, and conical, they vary in number in different species. The caterpillar of the common cabbage butterfly has five pairs; and it is to be observed that, when five pairs are present, none are found on the 4th, 5th, 10th, or 11th segments, but a pair respectively on the 6th, 7th, 9th, and 12th segments, the 12th being the last.

With respect to the various systems upon which insects have been classified, the student must consult the works of Linnæus, Fabricius, Burmeister; Latreille, in 'Règne Animal;' Kirby and Spence; and the productions of the Entomological Society. [Bombycidæ; Coleoptera; Diptera; Hemiptera; Orthoptera, &c.]

INSECTA, FOSSIL. Until within a few years the occurrence of insects in a fossil state could only be substantiated by reference to a small number of localities, situated (as at Aix in Provence) among lacustrine tertiary strata, or (as at Stonesfield in Oxfordshire, and Solenhofen in Franconia) among marine oolitic beds. But Mr. Prestwich has added traces of coleoptera from the coal formation of Coalbrook Dale, and Mr. Strickland parts of neuroptera from the lias of Warwickshire; Dr. Buckland obtained neuroptera from the oolite of Stonesfield, and Mr. Brodie portions of insects belonging to various natural orders from the lias of Somersetshire, Gloucestershire, and in the Wealden deposits of the Vale of Wardour in Wilts, and the Vale of Aylesbury.

Still the number of fossil insects, whether we estimate individuals or species, is very small compared to the probable number of anciently existing races; a circumstance quite explicable by reference to the phenomena which are now taking place in nature; for of upwards of 12,000 British species of insects there is reason to believe that but a very minute proportion is buried and preserved in lacustrine, æstuary, or marine deposits now in progress.

No doubt vast numbers of insects pass from the shore and fall in the sea, as we learn from the first voyage of Cook, who sailed through myriads of insects, some on the wing and others in the water, even thirty leagues from land off the coast of South America; but few of these escape the watchful finny races, or ever reach the bottom of the sea.

In like manner we find land insects heaped in profusion by winds on certain tracts of fresh water, and borne down the course of rivers by inundations; and these cases, by the aid of particular suppositions, such as evaporation or slow draining off of the water, may offer the nearest analogy to the facts actually observed in the greater number of insect deposits.

INSECTI'VORA, a group or order of small mammalia feeding chiefly upon insects and their larvæ. The Shrew, the Hedgehog, and the Mole are familar examples. [Carnivora.]

INSESSO'RES, the name given by Mr. Vigors to the *Perchers*, the second order of Birds in his system; and, as the families of which it is composed are very numerous, he classes them in comprehensive sections or tribes, which he thus denominates: — *Fissirostres* (Cuvier), *Dentirostres* (Cuv.), *Conirostres* (Cuv.), *Scansores* (Auct.), *Tenuirostres* (Cuv.).

The *Fissirostres*, according to Mr. Vigors, include the *Meropidæ*, the *Hirundinidæ*, the *Caprimulgidæ*, the *Todidæ*, and the *Halcyonidæ*.

The *Dentirostres* include the *Muscicapidæ*, the *Laniadæ*, the *Merulidæ*, the *Sylviadæ*, and the *Pipridæ*.

The *Conirostres* comprise the *Fringillidæ*, the *Sturnidæ*, the *Corvidæ*, the *Buceridæ*, and the *Loxiadæ*.

The *Scansores* consist of the *Ramphastidæ*, the *Psittacidæ*, the *Picidæ*, the *Certhiadæ*, and the *Cuculidæ*.

The *Tenuirostres* are composed of the *Nectariniadæ*? *Cinnyridæ*, *Trochilidæ*, *Promeropidæ*? and *Meliphagidæ*?

INSOLVENT is, literally, a man who cannot pay his debts. But a man is not properly called insolvent till he has been found to be so by the process to which he is liable under the insolvent acts, if he does not pay his creditors. The law as to insolvency applies to those who do not come within the operations of the law relating to Bankruptcy.

The Insolvent Law of England is administered by commissioners appointed by the crown, in a court called the Insolvent Debtors' Court, and three of the commissioners from time to time make circuits, and give their attendance at the assize towns or other places where prisoners may be ordered to appear.

The general object of the law as to insolvency is to release the debtor from prison, to free his person from liability as to debts contracted pre-

vions to his discharge, but to make all his present and future acquired property available for the benefit of his creditors. Where new creditors have a claim on the insolvent's subsequently acquired property, which is of such a nature that it cannot be taken in execution, it may be necessary to apply to a court of equity, which, in administering such estate of a deceased insolvent, will pay the creditors subsequent to the insolvency first, and then the creditors prior to the insolvency. The provisions of the various statutes relating to insolvency, and the mode of procedure under them, belong to a law treatise.

The Act 7 & 8 Vict. c. 70, which came into operation the 1st September, 1844, and is entitled 'An Act for facilitating arrangements between Debtors and Creditors,' is of the nature of an insolvent act. Under this act a debtor who is not subject to the Bankrupt Laws may apply by petition to a court of bankruptcy, and obtain protection from arrest, provided his petition be signed by one-third in number and value of his creditors.

The law of debtor and creditor has been a difficulty in all countries. In England an insolvent debtor may, in certain cases, be subjected to the operation of the Bankrupt Laws. [BANKRUPT.] If he cannot claim the benefit of the Bankrupt Laws, he is subject to the law that relates to insolvent debtors. The question of arrest and imprisonment for debt has been chiefly discussed with reference to insolvent debtors, that is, the class of debtors whose debts have not been contracted in the operations of trade or commerce, or not under such circumstances as to bring them within the Bankrupt Laws.

Formerly there were two kinds of arrest in civil cases, that which took place before trial, and was called arrest on mesne process; and that which takes place after trial and judgment, and is called arrest on final process. In the arrest on mesne process it was only necessary for the plaintiff to make an affidavit that the cause of action amounted to 20*l*. (7 & 8 Geo. IV. c. 71), upon which he could sue out a writ called a *capias*, which was directed to the sheriff, who thereupon gave his officers a warrant for seizing the alleged debtor. The Statute 1 & 2 Vict. c. 110, §§ 2, 3, 4, 5, 6, enacted that no person can be arrested for alleged debt before a judgment has been obtained against him, unless it can be shown to the satisfaction of a judge of one of the superior courts that the plaintiff has a cause of action against such person to the amount of 20*l*. or upwards, and that there is probable cause to believe that the defendant is about to quit England. A defendant may also be arrested upon mesne process when he has received an unfavourable judgment in the court for the relief of insolvent debtors (1 & 2 Vict. c. 110, § 85).

Arrest in execution is therefore now the only arrest that is of any practical importance: it means the arresting of a man after a court of justice has decided that he owes a debt. On this subject there has been difference of opinion. The arguments in favour of it are contained in a 'Supplementary Paper on Bankruptcy and Insolvency, by William John Law, Esq. Dissentient from the Report. Presented to both Houses of Parliament, 1841.

With respect to arrest in execution, Mr. Law's intimate knowledge of the relation of debtor and creditor has enabled him to answer fully all the arguments of those who attempt to show the insufficiency of this final arrest. He has proved beyond doubt the justice of this final arrest, or, if the word justice be objected to, its usefulness to the community. A man is not now arrested till he has disobeyed the judgment of a court of justice. It is his business to show why he disobeyed the judgment; and in the meantime either his person must be secured, or the judgment of the court must be treated as a mere idle form. It may be said, the plaintiff can proceed to take the debtor's property: but even visible property cannot always be got at; for, when the sheriff goes to seize it, 'some one on the premises holds up a bit of parchment called a bill of sale, and frightens him out again; there is not one plaintiff in five hundred, great or small, who has courage enough to indemnify the officer, and defy the fraud.' If there is this difficulty as to the taking possession of a debtor's visible property, what must be the difficulty of getting at the property of the debtor which is not visible? And what other mode can be suggested of compelling the defendant to give a true account of all his property than to imprison him until he does? 'A defendant has always been prone to place his property out of reach of an execution, but there has been this one restraint: he says to himself, 'If I make my property safe, they will take me, and then I must bring it forward.' When property only can be touched, the argument is changed; it becomes this: 'If I make my property safe, my enemy can do nothing.' So necessary is process against the person for process against the property, and so unreasonable is it to require of the creditor by record the establishment of any further case, in order to entitle him to an execution. His judgment is his case: the clearest duty lies on the other party to establish his exemption from the task of satisfying it.'

The general arguments in favour of final execution are supported by Mr. Law with facts equally strong, which also prove the efficacy of such arrest. The mode in which he has examined the arguments in favour of abolishing arrest, which are derived from certain returns, is completely convincing. He shows that arrest does make people pay who do not pay till they are arrested; that the examination to which insolvents are subjected exposes a great amount of fraud; and that the number of those who are induced to pay by the fear of arrest is considerable, just as the fear of other punishment prevents many persons from committing crimes who have no other motive to deter them. The fear of arrest is precisely the preponderating weight which is wanted to induce those whose honesty is wavering to incline to the right side.

The arguments of Mr. Law should be read by every man who wishes to form a sound judgment on the law of insolvent debtors in England; and his arguments will help to diffuse juster opinions on a subject in which a sympathy with debtors

the total forgetfulness of creditors, has led many well-meaning people to adopt conclusions that tend to unsettle all the relations of society, and to confound honest men and rogues.

In Scotland the being in a state of insolvency has the same effect in regard to questions of stoppage in transitu, and others connected with sale and delivery, as it has in England. The word is often used in connection with the bankrupt law, because being insolvent is one of the ingredients of Notour Bankruptcy. Cessio Bonorum is the name of the procedure that in Scotland stands in place of the insolvency relief system in England.

INSTANCE, COURT OF. [ADMIRALTY COURTS.]

INSTINCT is a natural impulse to certain actions which animals perform without deliberation, and without having any end in view, and without knowing why they do it. That the spontaneity of instinct operates unconsciously is fully established by observation. A calf butts with its head before its horns are grown; and the hen broods over the eggs of another species, or even simulated eggs, as patiently as over its own. Lastly, children in certain states of the body are observed to devour eagerly chalk and other earths which are the proper remedies for the disease, and a feverish patient will have a taste for acid drinks. These instincts are evoked by diseases, in consequence of a change in the mixture of the organical elements of the body.

Instinct differs from intellect by the unerring certainty of the means it employs, the uniformity of its results, and the perfection of its works prior to and independent of all instruction or experience; and lastly, by the pursuit of nothing beyond what conduces directly either to the continuation of the individual or the propagation of the kind. But the arts of rational creatures proceed slowly, while the means they employ are always various and seldom the best.

INSTITUTION. [ADVOWSON; BENEFICE.]

INSURANCE, FIRE. It might have been expected that the great advantage to society of individuals providing against loss, by means of trifling annual payments, would have been so far acknowledged by the British legislature as to prevent the imposing of a tax upon prudence. Such, however, is not the fact, and a duty is levied at the rate of 3*s.* per cent. per annum upon the amount of property insured against destruction by fire, which rate is, in most cases, equal to 200 per cent. upon the premium demanded by the insurance offices, which premium is found sufficient to cover all losses, as well as to defray the expenses of management, and to afford an adequate return to capitalists who embark their property in the undertaking. That many persons neglect to insure against the risk of fire from being compelled to pay 4*s.* 6*d.* for each 100*l.* value of their property, who would not neglect such precaution if they could attain security by payment of 1*s.* 6*d.* for a like amount, will be readily acknowledged; and the propriety of repealing this tax has been frequently urged.

During a period of distress experienced by the agriculturists, the landowners and farmers of Great Britain obtained in 1833 an advantage over other classes of the community by the repeal of the duty upon insurance of farm produce, farming stock, and implements of husbandry (3 & 4 Will. IV. c. 23).

Cases occur in which frauds are practised by parties insuring for more than their property is worth; and there are also cases in which property has been burnt by insolvent persons in order to obtain the insurance money. The companies sometimes consider it prudent to pay the money, though the claim might be disputed; and sometimes it is successfully disputed.

The amount of farming stock insured in 1847 was 63,455,059*l.*, of which 5,263,003*l.* was insured in Scotch and Irish offices; 35,085,718*l.* in London offices; and 23,106,338*l.* in English country offices.

The duty on fire insurances has, of late years, exceeded a million sterling, annually.

INSURANCE, LIFE. [LIFE INSURANCE.]

INSURANCE, MARINE. [MARINE INSURANCE.]

INTA'GLIO, an Italian word, composed of *in* and *tagliare*, to cut. It is a term of art applied to small works of the gem class, in which the design is indented or engraved, to distinguish them from those in which the subject or device is raised, called *Cameos*.

The Greeks carried this branch of the fine arts to the same perfection which their genius and feeling for the beautiful enabled them to reach in all others to which they devoted their attention; but we do not trace its existence among them to a very remote date. We have no information respecting the process by which the ancient intagliatori (or scalptores) executed works which are now justly referred to as the best examples of the art. The lathe is not described by any ancient writer; but the works themselves seem to afford evidence of its employment, and Pliny refers to the invention of an instrument which he calls 'tornum' ('Nat. Hist.,' lib. vii.), which may fairly be supposed to mean a turning machine or tool. It is certain they were acquainted with the use of diamond powder.

The modern practice of cutting stones in intaglio is by an apparatus similar in principle to the turning lathe, which gives the cutting tool, placed horizontally, a quick rotatory motion, and, the stone on which the design is to be engraved being brought in contact with it, the surface is ground away or indented, till the effect required is produced. Instruments of various sizes are used, which can easily be removed and replaced, and it is usual, during the process of engraving, to supply the points of the tools with diamond-dust mixed with a little sweet oil. As the work proceeds, proofs are occasionally taken in wax.

Engraving dies is an important branch of the art of intaglio, and requires great care and skill for its perfection. The die is made of finely prepared and tempered steel. When the first intaglio, or original die, is executed, it forms a *matrix* (or mould), into which a conically formed block of softer steel is compressed, the matrix first undergoing a process by which it is hardened. An impression taken in this way is called a *puncheon*. When this is completed (and frequent

annealing and restriking are necessary before it is perfected), the engraver retouches the work, now in relief, and gives it all the delicacy of the original model; the metal is then hardened, and, by pressing this puncheon into other steel which is soft (by almost a repetition indeed of the before-mentioned process), it serves for the purpose of making the dies for coining.

INTEGER, a whole number, as distinguished from a fraction.

INTEGRATION, INTEGRAL CALCULUS. The integral calculus is the inverse of the DIFFERENTIAL CALCULUS; that is to say, if, A being given, it be a question of the differential calculus to find B; then, B being given, it is a question of the integral calculus to find A.

The question of finding a differential coefficient requires the attainment of the limit of the ratio of two simultaneously diminishing increments of y and x, y being a function of x: and therefore the fundamental question of the integral calculus is as follows: Knowing the limit of the ratio of the increment of y to the increment of x, required the function of x which y is. Or, having given a function of x, required that function of which the given function is the differential coefficient.

But, though this view of the fundamental question is sufficient in pure mathematics, it is not calculated to connect the process of integration with those conceptions which the mind employs in application to geometry or mechanics. We are here accustomed to a rough species of integral calculus, with which the preceding seems at first to have no connection. Thus a number of small straight lines joined together appear to compose a curve with sufficient exactness: we arrive at the calculation of a body's variable motion by supposing it uniform during small intervals, and accelerated at the end of each interval: and we obtain the area of a curve with any degree of exactness by subdividing it into a large number of small curvilinear areas, for each of which we substitute a rectangle. It should seem, then, that when, making the proper use of the terms, we say that every magnitude is made up of an infinite number of infinitely small parts, we might add that every one of the parts is of a more simple kind than the whole. Thus we appear to have a right to say that a *curve* is made of infinitely small *straight lines;* that *gradual* variable motion is made up of infinitely small separate *impulses;* that the area of a *curve* is made up of infinitely small *rectangles.* A correct understanding of this connection is the key to that of the integral calculus, and most completely so to that of its ready application.

An integral is said to be definite when its limits are given: and indefinite when they are not given.

INTEGRATION, FINITE. By this term is meant the summation of any number of terms of a series which follows a regular law.

INTELLECT (*intellectus*), that which perceives or understands, comprehending all the cognitive powers of the mind, in contradistinction to the active powers of the will. In the Aristotelian philosophy the intellect (νοῦς) first works on the phantasms, and discerns by a spontaneous energy what in many is one, what in things dissimilar is similar and the same (τὸ δὲ ἓν ποιοῦν τοῦτο ὁ νοῦς ἕκαστον). By this means it attains to a new kind of perceptions (εἴδη), more comprehensive than those of sense; and each of these general ideas subsists entire in each individual of an infinite multitude without losing its own unity and permanence. On the other hand it is the source of those primary principles on which all science rests, as conversant about universal and demonstrable truth.

For intellect Mr. Stewart prefers the vernacular term understanding, which he employs in the same extensive signification. But the critical philosophy of Kant distinguishes the intellect into two faculties, understanding and reason. The understanding acting on experience merely compares, judges and measures its representations, and is conversant solely with their mutual limits and relations, classifying them according to certain schemes of its own which are called categories. While however the understanding is thus limited, the activity of the reason is unbounded, and, as the principle of principles, it is the base and the verification of every special principle and reasoning.

INTERCALARY. [KALENDAR.]

INTERDICT, ECCLESIASTICAL, a mode of censure employed at times by the Roman Catholic Church, by which, in consequence of some offence alleged to have been committed by the people or rulers of a town or country, the Pope forbade by a bull the performance of any kind of church rites within the same; the church-service was suspended, the sacraments were not administered, and the funeral service was not read. The use of interdicts appears to have originated with the bishops in the ninth century. In the middle ages this measure was often resorted to by the popes in consequence of some serious dispute with the sovereigns of particular countries, and it had the effect of throwing whole kingdoms into consternation, and even into a state of rebellion, by which the refractory sovereigns were obliged to sue for pardon from the pontiff.

INTERDICT, in the law of Scotland, supplies the place of an injunction from a court of equity in England. It is a prohibitory order forbidding some act from being done, and it is obtained on the application of the party who would be injured by the performance of the act. It may be issued by the Court of Session, or by the Sheriff's Court. Interdicts in the Court of Session are frequently obtained for preventing inferior courts, or courts of limited operation such as the ecclesiastical courts, from exceeding their jurisdiction.

INTEREST, money which is paid for the use of other money, the lender stipulating for a fixed sum to be paid yearly, half-yearly, or quarterly for each 100*l.* lent, until the money is returned. When this is not the case, and when the money paid for the loan depends upon the success of the undertaking, or any casualty not connected with the duration of life, it is called a *dividend:* when the money and its interest are to be returned by yearly instalments, and paid off in a certain fixed number of years, it is called an *annuity certain*

but, when the payment is to depend upon the life of any person or persons, it is called a *life-annuity*.

A simple rule for converting shillings, pence, and farthings, into the decimal of a pound might be made of such frequent use in calculations connected with interest, that we begin with it. The rule is founded upon the circumstance of one farthing being very little more than the thousandth part of a pound.

To convert any number of shillings, pence, and farthings to the decimal of 1*l.*, as far as three places. *Rule*:—Allow 100 for every two shillings, and 50 for the odd shilling, if there be one, and a unit for every farthing in the pence and farthings, adding 1 if the pence and farthings be sixpence or upwards. Then make three decimal places of the result. Thus 1*s.* 7¾*d.* give 50 and 31 and 1, or 82, which, converted into a decimal of three places, is .082, or 1*s.* 7¾*d.* is .082*l.*: the truth lies between .0822 and .0823. Again, 17*s.* 4½*d.* give 800 and 50 and 18, or 868, so that 17*s.* 4½*d.* is .868*l.* very nearly.

To convert any decimal of a pound of three places into shillings, pence, and farthings. *Rule*:—Take away the decimal point, and make a whole number of the three places: for every hundred of this whole number allow two shillings, and another shilling to the remaining 50, if so much remain: let every unit of the remainder be one farthing, but strike off one if the remaining number exceed 24. Thus .973*l.* gives 18*s.* and 1*s.* and 23 farthings, or 19*s.* 5¾*d.*; but .147*l.* gives 2*s.* and 46 farthings, or 2*s.* 11½*d.* The following are examples of both rules:—

6¾*d.*	is .028*l.*	16*s.* 0½*d.*	is .802*l.*
3*s.* 2*d.*	is .158*l.*	17*s.* 11*d.*	is .895*l.*
4*s.* 9¼*d.*	is .238*l.*	19*s.* 10½*d.*	is .993*l.*

Interest is usually reckoned by the sum paid yearly for each 100*l.*; thus 4 *per centum*, abbreviated in 4 *per cent.*, means that 4 pounds is paid yearly for 100*l.*, or that one-twenty-fifth of the whole sum is paid yearly for its use. In some cases, as in the dividend of a bankrupt's estate, a part is compared with the whole by stating how much of each pound is paid. The preceding rule gives the means of reducing one to the other instantaneously; thus since 4*s.* 9¼*d.* is .238*l.*, a bankrupt who pays the former sum per pound, or .238*l.* for 1*l.*, pays 23.8*l.* for each 100*l.*, or 23⅘ per cent. Similarly 37 2/10 per cent., or 37.2*l.* for 100*l.*, is .372*l.* for 1*l.*, or 7*s.* 5½*d.* in the pound.

Interest is called *simple* when it is paid as soon as due, or when, if deferred, interest is not charged upon interest. But, when the latter charge is made, the interest is called *compound*. In simple interest it makes no difference whether it be payable yearly or at shorter terms; but this is not the case in compound interest. The sum lent is called the *principal*; and the principal, together with the interest, the *amount*: also the principal is called the *present value* of the amount.

A common question of simple interest requires merely the process of taking a given fractional part of a sum of money, and need not be explained at length in a work of reference. One example however will serve to show the facilities which the preceding rule affords.

What is the interest upon 697*l.* 13*s.* 4½*d.* at 4½ per cent. for 7¾ years?

To find this, we must take the hundredth part of the sum 4½ times for one year's interest, which we must then repeat 7¾ times.

£697 13*s.* 4½*d.* is £697.668

4½

2790.672
348.834

100)2139.506

21.39506 or 21.39506
7¾ 8

149.76542 171.16048
10.69753 534877
5.34876 165.81171

165.81171

Answer, 165.812*l.* or 165*l.* 16*s.* 3*d.*

When interest is to be taken for a number of days, a person who is often required to perform the operation will provide himself with a set of tables, several of which are published. Those who do not often meet with the operation must take such a fraction of a year's interest as the number of days in the question is of a year. The following rule will facilitate the introduction of the arithmetical rule of practice. *Rule*:—Whenever the portion of an amount per annum is to be taken corresponding to a number of days, calculate as if the year had only 360 days, and from the result subtract its 72nd part, or one farthing in eighteenpence, or 3½*d.* on each guinea. This falls short of the truth by about one penny in 20*l.* Thus suppose the yearly interest is 283*l.* 17*s.* 4*d.*, and that for 254 days is required—

283.866

180 . . ½ . . . 141.933
60 . . ⅓ . . . 47.311
12 . . 1/5 . . . 9.462
2 . . 1/6 . . . 1.577

8)200.283

9) 25.035

2.782
200.283

197.501

Answer, 197*l.* 10*s.*; or, adding 1*d.* for each 20*l.*, about 197*l.* 10*s.* 10*d.*, which is within one halfpenny of the truth.

It is sometimes necessary to express the interest by the day, in which the following rules will be convenient.

To turn a given amount per day into the corresponding amount per year, to the number of pence per day add its half, and take as many pounds as there are now pence; this is the amount in 360 days, and five days' allowance added gives the result.

To find out how much a sum per annum yields

per day, subtract one-third from the pounds, and take as many pence as there are in the result. The answer is the preceding result diminished by one farthing in eighteenpence, or its 72nd part.

Thus $3\frac{3}{4}d.$ per day, or 3.75 pence, gives 3.75 + 1.875, or 5.625 per 360 days, which is 5*l.* 12*s.* 6*d.* To this add five times $3\frac{3}{4}d.$, or 1*s.* $6\frac{3}{4}d.$, which gives 5*l.* 14*s.* $0\frac{1}{4}d.$ per annum.

Again, 26*l.* 14*s.* 7*d.* per annum, or (nearly enough) 26.7*l.*, gives 26.7—8.9 pence per day nearly, that is, $17\frac{3}{4}d.$ Diminish this by one farthing, and $17\frac{1}{2}d.$ is the answer within a farthing.

All persons who attempt for the first time to use decimal fractions in money computations imagine that they gain nothing, but a little practice soon convinces them of the contrary.

The rule above given only extends to three places of decimals; but the complete rule is short and easily remembered. For the first place, as before, one for each pair of shillings; for the second and third, 50 for the odd shilling, and one for every farthing in the pence and farthings, with an additional one for sixpence; for the fourth and fifth places, 4 for each farthing above the last sixpence, with one additional one for every 6 farthings so used; for all that follow, take 6 for a denominator, the number of farthings above the last three-halfpence for a numerator, and set down the figures of the corresponding decimal fraction. The following are instances, the rendering to be made in the head; the lines give subdivisions formed by the different rules.

£1	11	$4\frac{1}{4}$	=	£1.5	69	79	1666	.....
3	10	$0\frac{3}{4}$	=	3.5	03	12	5	
2	0	$10\frac{1}{2}$	=	2.0	43	75		
6	7	11	=	6.3	95	83	3333	.....

Compound interest cannot be treated to any sufficient extent in a popular work. Tables and a description of their use will be found in the 'Penny Cyclopædia,' article 'Interest,' and also in the Treatise on 'Annuities' in the Library of Useful Knowledge.

INTEREST. (Law.) [Usury.]

INTERJECTIONS have been defined to be 'words used to express some passion or emotion of the mind,' as exclamations of joy, grief, astonishment, &c. Interjections however can hardly be considered as a distinct part of speech, but are more properly natural sounds common to all men when laughing, in pain, &c.

INTERLOCUTORY (*inter*, between, and *loquor*, to speak), a term applied to those judgments, decrees, and orders of courts of law and equity which are made in the progress of a suit before final judgment. Thus, orders for the production of papers, or for taking an account of the dealings out of which the dispute arises, are interlocutory orders or decrees; and those judgments which, though they establish the right of the plaintiff, leave the amount of damages to be ascertained by a jury, are interlocutory judgments.

INTERLUDE, a brief piece of church music for the organ, seldom exceeding a few bars, generally produced *extempore*, and played after each stanza, except the last, of the metrical psalm. This, being merely for the purpose of giving breathing time to the singers, should always be short and grave, and in keeping with the psalm tune. On the stage an interlude is a short entertainment introduced between longer pieces, or between the acts of a play. The term is seldom used now.

INTERMENT, the burial of a dead body in the earth. The manner of disposing of the dead has varied in different nations; but the most general modes have been interment and burning. The practice of burying is probably the oldest, and with most nations has been the ordinary mode of sepulture; but the custom of burning the body and afterwards collecting the ashes and depositing them in a tomb or urn, became general among the Greeks and Romans. Among the Greek nations however both the burning of the dead and the interment of dead bodies were practised. The Romans in the earlier periods of their history certainly buried their dead, but burning afterwards became common. The practice of burning the dead appears to have gradually gone into disuse under the Empire; and probably it was never practised by the Christians.

The places set apart for burial are generally called cemeteries, which is a Greek term signifying 'a place of rest or sleep,' and was applied to common places of interment by the early Christians. Among the Greeks cemeteries were perhaps always without the cities. Among the Romans the tombs were generally placed by the sides of the public roads. It was an enactment of the Twelve Tables that a dead body was not to be buried or burnt within the city. (Dirksen 'Zwölf-Tafel Fragmente,' p. 657.)

The early Christians buried outside of cities, but they afterwards transferred their burial-places to the vicinity of the churches and within towns, where they have continued to be generally situated up to the present time. But, when the church is surrounded by houses, it is not a fit situation; for the putrid exhalations arising during the decomposition of animal bodies are injurious to health, and capable of giving rise to, or at least of encouraging, the progress of various pestilential diseases, of which the most common in this country are low nervous or typhus fevers.

Of late years the subject of interment has attracted much attention in England, and a great amount of information has been collected. The evidence proves that emanations from crowded burial-grounds and from the vaults of churches injuriously affect the health of persons who live near them; and that these emanations, when sufficiently concentrated, may produce speedy death. The general conclusion, 'that all interments in churches or in towns are essentially of an injurious and dangerous tendency' ('Report on the Practice of Interment in Towns') is at least strong enough, coupled with other reasons, to justify the legislature in forbidding such interments, and placing all burying-grounds under such regulations as may prevent the effluvia from the dead from becoming detrimental to the health of the living. There is also much mischief to health arising from the delay in interment, particularly among the poor. The Report states, that 'in a large proportion of cases in the metropolis, and in some of the manufacturing districts, one room serves

one family of the labouring classes: it is their bed-room, their kitchen, their wash-house, their sitting-room, their dining-room; and, when they do not follow any out-door occupation, it is frequently their work-room and their shop. In this one room they are born, and live, and sleep, and die amidst the other inmates.' Among the poor in some parts of London the average time that a body is kept is about a week, which sometimes arises from inability to raise money for the funeral expenses, as well as other causes; and, when there is only a single apartment, the dead and the living occupy it together. The injurious consequences to health from the presence of a dead body, sometimes in a state of rapid decomposition, in a small ill-ventilated apartment, and particularly when death has been the consequence of malignant disease, cannot be disputed; and the moral effect on the living is demoralising. The expense of funerals is another head which is examined in this Report.

Something has been done in this direction by the 11 and 12 Vict. cap. 63 (the 'Health of Towns' Act'), in which, by sect. 81, local boards are empowered to provide premises for the decent reception of the dead previous to interment, and for the economical interment of any corpse received therein; and the General Board of Health, by sect. 82, are empowered to prohibit interments in overcrowded burial-grounds. Sect. 83 also prohibits the construction of vaults for the purpose of interment under or within the walls of any church to be built after the passing of this Act, or the formation of any burial-ground without the consent of the General Board of Health.

The annual expense of funerals in England and Wales, according to a proximate estimate made in the Report, is 4,870,493*l*. This sum, enormous as it is, may be considered an under-estimate. 'The cost of the funerals of persons of rank and title varies from 1500*l*. to 800*l*. or less, as it is a town or country funeral. The expenses of the funerals of gentry of the better condition vary from 200*l*. to 400*l*., and are stated to be seldom so low as 150*l*.' The average cost of funerals of persons of every rank above paupers in the metropolis may be taken at 14*l*. 16*s*. 9*d*. per head. The establishment of cemeteries by Joint Stock Companies near London and other towns has done something by diminishing the amount of interments in crowded places, but the expenses of interment have perhaps not been diminished by them.

The Report concludes (p. 197) with a summary of the evils which require remedies, and a suggestion as to the remedies. There may be difference of opinion as to the degree in which the evils exist; but none as to the existence itself. The numerous matters contained in the Report can only be indicated here. It should be consulted by all who take an interest in the well-being of society, as a most valuable contribution to the statistics of civilised life.

(*A Supplementary Report on the Results of a Special Inquiry as to the Practice of Interment in Towns, made at the request of Her Majesty's principal Secretary of State for the Home Department*, by Edwin Chadwick, Esq., Barrister-at-Law. London, 1843.)

INTERMITTENT. [Ague; Fever.]

INTERNAL and EXTERNAL, geometrical terms applied to the angles made by the sides of a bounded figure. The angle made by two sides is an internal angle; that made by a side and a side produced is an external angle.

INTERNATIONAL LAW. This term was originally applied by Bentham to what is generally called 'the law of nations.' The term 'law of peace and war' has been sometimes used as synonymous with 'the law of nations,' and as indicative of the boundaries of the subject. It was thus restricted to the disputes which governments might have with each other, and did not in general apply to questions between subjects of different states, arising out of the position of the states with regard to each other, or out of the divergences in the laws of the separate states. But under the more expressive designation, International Law, the whole of these subjects can be comprehended and examined, and thus several arbitrary distinctions and exclusions are saved. The following instances may be taken:—A port is put in a state of blockade; a vessel of war of a neutral power breaks the blockade: this is distinctly a question between nations, to be provided for by the law of peace and war, in as far as there are any consuetudinary rules on the subject, and the parties will submit to them. But suppose a merchant-vessel belonging to a subject of a neutral power attempts an infringement of the blockade, and is seized—here there is no question between nations in the first place. The matter is adjudicated on in the country which has made the seizure, as absolutely as if it were a question of internal smuggling; and it will depend on the extent to which just rules guide the judicature of that country, and not on any question settled between contending powers, whether any respect will be paid to what the party can plead in his own favour, on the ground of the comity of nations, or otherwise. But there is a third class of cases most intimately linked with these latter, but which are completely independent of any treaties, declarations of war, or other acts by nations towards each other. They arise entirely out of the laws of the respective nations of the world, in as far as they differ from each other. The 'conflict of laws' is a term very generally applied to this branch of international law, and the circumstances in which it comes into operation are when the judicial settlement of the question takes place in one country, but some of the circumstances, of which cognisance had to be taken, have occurred in some other country where the law applicable to the matter is different. One of the most common illustrations of this subject is,—a judicial inquiry in England whether a marriage has taken place in Scotland according to the law of that country; or an inquiry in Scotland whether a marriage has taken place according to the law of England; in either of which cases there will generally be the further and nicer question, Which country's law ought to prevail as the criterion?

Thus the three leading departments of international law are:—

1. The principles that should regulate the conduct of states to each other.

2. The principles that should regulate the rights and obligations of private parties, arising out of the conduct of states to each other.

3. The principles that should regulate the rights and obligations of private parties, when they are affected by the several codes of different nations.

The first of these has been the principal subject of the works of Grotius, Puffendorf, Vattel, and other publicists, who have derived from general principles of morality and justice a series of rules for the conduct of nations towards each other, and subsidiarily for the conduct of their subjects in relation to international questions. It has been usual to call this department the 'Law of Nature,' as well as the Law of Nations, on the supposition that it is founded on the universal principles of justice.

The Law of Nations wants one essential element of that which is entitled to the term law—a binding authority. Nations, even the most powerful, are not without checks in the fear of raising hostile combinations and otherwise; but there can be no uniformity in these checks; and in general, when the interest is of overwhelming importance, and the nation powerful, it takes its own way. The importance of the questions which may be involved in the Law of Nations thus materially affects the question how far it is uniformly obeyed. In minor questions—such as the safety of the persons of ambassadors, and their exemption from responsibility to the laws of the country to which they are accredited, and in other matters of personal etiquette, a set of uniform rules has been established by the practice of all the civilised world, which are rarely infringed. But in the more important questions, regarding what is a justifiable ground for declaring war? what territory a nation is entitled to the sovereignty of? what is a legitimate method of conducting a war once commenced? &c.—the rules of the publicists are often precise enough; but the practice of nations has been far from regular. The later writers on this subject have from this circumstance directed their attention more to the means by which any system of international law can be enforced, than to statements of what may be just, but has little chance of being enforced.

The second department into which we have considered international law divided—the rights and obligations of individuals as affected by the conduct of states towards each other—has, like the first, been examined by the publicists in their theoretical manner; but it has never, perhaps, received so much practical illustration as it did in the British courts, particularly the Prize Admiralty Court, during the late wars.

The third division of international law is that which most properly comes under the head 'Conflict of Laws,' the principles that should regulate the rights and obligations of private parties when they are affected by the codes of different nations. The leading rule of international law in this department is, that each civilised nation is to give efficacy to the laws of another country, unless i own laws or the general principles of justice a thereby contradicted.

INTERPLEADER, or ENTER PLEADE the name of a suit or action at law, or in equit When a person who holds goods, or owes a debt duty, is sued by two or more claimants, t court will order them to interplead upon the a plication of the party sued, and upon his delive ing up or offering to deliver up the matter in di pute, and disclaiming all interest therein. T legislature, upon the recommendation of t late Common Law Commissioners, by the Statu 1 and 2 Wm. IV. c. 58, has rendered this mod of relief more easy of attainment in courts of la

INTERPOLATION. Every mathematic table consists of a series of values of some a gebraical expression corresponding to equidista values of the letter on which it depends. Thu the most extensive table of logarithms in comm use is a succession of values of log. x, answering $x = 10{,}000$, $x = 10{,}001$, $x = 10{,}002$, and so up to $x = 99{,}999$. The process of interpolatio is that of inserting in a table values of the tabulate function intermediate to those given in the tabl For example, suppose that p, q, r, s, &c., a written in a table opposite to a, $a + b$, $a + 2$ $a + 3b$, &c., and it is demanded what is t value of the function corresponding to $a + 2\frac{1}{2}$ this is a question of interpolation.

Such a question can only be solved approx mately, but, generally speaking, the values in t table are themselves but approximations, and t interpolated values are as correct as the tabul ones. A sufficient rule for most cases is, if and $a + 1$ have A and B in the tables, differi by D, then to $a + m$, m being a fraction le than unity, belongs $A + m D$, or $A - m D$, cording as B is greater or less than A.

INTERPRETATION. (Mathematics.) T word is coming into use as descriptive of a proc which it has long been customary to empl though without any express name. When algebraical definition is laid down, there is f quently some restriction implied in the manner making the definition, so that the process to wh it leads presents more cases than can be explai by it, or were contemplated when it was ma For example, the abbreviation of a, aa, aaa, into a, a^2, a^3, and the rules which spring fr it, soon lead to such results as—

$$a^{-3}, \quad a^0, \quad a^{\frac{1}{2}}, \quad a^{-\frac{1}{2}};$$

which, though they follow from algebraical p cesses, yet, when they first arrive, are with algebraical meaning. In such a case, the pro of interpretation enters. The question is, w should such symbols mean? have they a neces meaning? if not, is there any meaning which be more convenient than another? A defini has been laid down, leading to results w cannot be explained by it: required the exten of the definition which will enable it to exp its own results.

Examples are found in all works which exp the principles of algebra. The rule always is the interpreted meaning of the new symbol

h as will make the whole of the process true which they were obtained. Now, as they must re been obtained by the application of those mula which are true of the intelligible results the definition, the rule just mentioned leads to following: let the meaning of the intelligible ults be such as will make the formulæ of the elligible ones true of them. Thus, in the pre ling instance, the fundamental formula which nects the terms of the series, a, a^2 a^3, a^4, &c.,

$$a^m \times a^n = a^{m+n}$$

ich is intelligible when m and n are positive hole numbers. Suppose it now required to in pret a^0, that is, to give it a meaning which will make the preceding formula true of it. rite 0 instead of m, and we have $a^0 \times a^n = + n = a^n$, or a^0 must stand for 1. Again, sup se it required to interpret $a^{\frac{1}{2}}$. In order that preceding formula may be true of the meaning $a^{\frac{1}{2}}$, we must have

$$a^{\frac{1}{2}} \times a^{\frac{1}{2}} = a^{\frac{1}{2}+\frac{1}{2}} = a^1 \text{ or } a,$$

ence $a^{\frac{1}{2}}$ must stand for $\sqrt{a}$. And similarly other cases.

INTERVAL, in Music, is the difference or stance between two notes of different pitch. *Intervals* are *Simple* when confined within the tave, *Compound* when they exceed it, and are med according to the distance of the two ndary notes. Thus the interval of a whole e (C D) is called a 2nd; of a whole tone and a nitone (C E♭), a minor 3rd, &c.

INTESTACY is either the dying without a ll, or with a will which does not dispose of the hole of the real or personal estate of the de ased; and therefore there may be either general partial intestacy. Real estate, not disposed of will, descends to the heir. [HEIR; DESCENT.] ersonal estate, not disposed of by will, goes to e administrator. [ADMINISTRATION.]

INTESTINA (*Intestinaux*), the second class the *Radiata*, or fourth division of the animal ngdom, according to the classification of Cuvier. the 'Règne Animal' this class is divided into o orders, *Cavitaria* and *Parenchymata*, which lude all the *Entozoa* of Rudolphi; but the term estina, if retained at all, should be applied only the true intestinal worms, or those parasites hich live in the intestines of other animals, and ould exclude the Entozoa which are found in e cellular tissue and substance of the different scera of the body.

The principal species of worms infesting the omach and intestines of man are enumerated der ANTHELMINTICS. For further details see NTOZOA.

INTESTINES are that portion of the digestive nal into which the food is received after it has en partially digested in the stomach, and in hich its further assimilation, the separation and sorption of the nutritive matter, and the re oval of that which is excrementitious, take place. n an adult, the intestines consist of a convoluted th of from 30 to 40 feet in length, and are, from e difference of their diameters in different parts, vided into the *small intestines*, which comprise about the first four-fifths, and the *large intestines* which constitute the other fifth of their length. The former again are divided into the *duodenum* into which the ducts from the liver and pancreas open, and in which the chyme from the stomach is converted into chyle; the *jejunum*, in which the absorption of the nutritive matter of the food is principally effected; and the *ileum*. The large intestines are divided into the *cæcum*, *colon*, and *rectum*.

INTONATION, in vocal music, is the tuning of the voice—the singing true or false—in tune or out of tune. Correct intonation is the first requisite in a singer; this wanting, all his other musical qualities, however good, are unavailing.

INULA, a genus of composite plants. *Inula Helenium* (Elecampane), one of the species of this genus, is an indigenous perennial herbaceous plant, found in moist meadows, the root of which is used in medicine. It is tonic and stimulating, and is employed in debility of the stomach, but is not much used.

INULIN, a peculiar vegetable substance, spontaneously deposited from a decoction of the roots of the *Inula Helenium*. It is a white powder, insoluble in cold water, and soluble in hot water, from which it is deposited on cooling.

INVENTION AND DISCOVERY. The rights of individuals as to the honour due to the origination of new views, processes, or methods, are matters of constant discussion in the history of letters and science.

Invention and discovery are, for our present purpose, synonymous terms: they always were so until modern times. As commonly used, the first word signifies the formation of something which would not necessarily have existed but for the invention; the second means the finding out that which always did exist, and would have existed whether the discovery had been made or not. The words have some analogy with those of problem and theorem in geometry: and particularly in this, that invention must be ultimately a suggestion of discovery. The inventor of modern ink, which till his time had never existed, discovered that a mixture of galls and sulphate of iron would produce a durable dark fluid: his invention consisted in the application of his discovery to the art of writing. There must be a discovery preceding every invention; but it does not follow that every discovery leads to invention. But yet there are some cases in which the preceding definitions fail to describe the actual use of words: for example, bichromate of potash was never found in nature, never discovered: its elements were compounded in the laboratory by its inventor. But the chemists would not call this an invention, nor anything but a discovery: we should recommend them to draw the distinction, as useful to the memory in relation to the history of their science.

There is in the words discovery and invention a tempting resemblance, often just, and often fallacious, to those of theory and practice. But in fact each of the things must be subdivided into theoretical and practical. The effect of the non-spherical form of the earth upon the moon's motion was discovered theoretically: the variation and the

evection were discovered practically. As to inventions, we call Davy's safety lamp a theoretical invention: for the question given was how to overcome a certain danger, generally? and it was not even assumed that a lamp was to be constructed. But the common story of the boy who saved his labour by tying a string from the valve he was employed to open and shut to a part of the machinery which moved in such a manner as to do it for him, is, if true, a record of practical invention. Still there is truth in this, that practical men, properly so called, have invented oftener than they have discovered; and that theoretical men have discovered more often than they have invented.

It is no wonder that the early history of discovery should be confused and uncertain: the loss of documents, which operates on all our first knowledge of antiquity, is a sufficient explanation. Nor is it surprising that first writers should be persons of unsettled claims; that in the case of Euclid, for example, we should not be so well able to say where his discoveries began as where they ended. But it does seem strange that in matters of our own day, or that immediately preceding, it should be a question to whom a right of discovery should belong, when the only tangible matter is a book, to the date of the publication of which there is every possible attestation.

There is one most important preliminary consideration, which will, in the minds of those who for the first time give it due attention, change the face of the whole question. When the period arrives at which a discovery becomes possible, there are many courses which lead to it, and many ships sailing on each of these courses. It is the same in matters of science, to an extent which will not be easily credited by those who are unacquainted with its history. And this greatly enhances the merit of most original researches. The character of accidental good fortune disappears when we see that the progress of knowledge seems to bring new results within the possible reach of many, but within the actual grasp only of one. Is there, then, nothing accidental in discovery and invention? We answer that there is something, but that the accidents which *might* produce discovery are happening to all, and frequently; while the accidents which *do* produce it happen to those only who are ready to take advantage of them. But this it may be said is reasoning in a circle; for, if we are asked how we distinguish the person who is ready to take advantage from the one who is not, we have only the discovery to point to. We reply, that it generally happens that the persons who can thus fix a casualty are also those who give evidence of successful research in cases where fortune shows no special favour. It is our conviction that no accidents are valid except those which happen to the proper men at the right times; and that there are usually other means of showing this besides the success of the accidents themselves.

Before we can examine the title to a discovery, it must first be settled what the discovery is: and this is frequently the greatest difficulty. The case of the steam-engine is constantly under discussion; and the principal point at issue is, what is the

steam-engine? Heron of Alexandria certainly produced rotatory motion by steam, and, with sufficient funds, could have ground all the corn in Egypt by his method. If we assign the merit to the person who contrived such an economy of fuel as to place the use of steam on something like its present footing of convenience, it then becomes a doubt whether any except Watt has the claim. M. Arago remarks on this subject, that a watchmaker would be struck dumb by the question, who invented a watch? The thing as it now exists is not the invention of any one person. As long as there is any national feeling in the discussion, one or another definition will be proposed, constructed to suit the advocacy of one or another claim.

It may happen that, in a complicated instrument or method, the perfecting of which extends over a long period, there is some one distinguishing characteristic, the introduction of which marks the main epoch of the invention. In the case of the watch, for instance, if we ask for the distinctive definition of the term, we find that it is not merely an instrument for measuring time, which would include the clepsydra, nor an application of wheelwork for that purpose, which would include the clock; but it is the use of a spring for the regulator, in which consists the distinction between a watch and other horologes. But it is not an uncommon practice of writers to strip a word of all its accessories, and to attribute (justly enough perhaps) the invention so cut down to some one person, and then to clothe the word with all its most modern associations, and the favoured inventor with all the glory which ought to be divided among many. When the steam-engine is reduced to a tea-kettle, or at most to a pump, it is Avery, or De Caus, or Worcester, or Newcomen, or Papin, &c., &c., who invented it, according to the country or the fancy of the writer; but, when once the claim is established, the tea-kettle throws out a condenser, and the pump runs along the railroad at sixty miles an hour.

It may indeed happen that the amount of claim may be materially augmented by the view which the discoverer takes of his title. Columbus inferred, on true principles, the possibility of crossing the Atlantic, spent the energies of a life in procuring the means of making a trial, and is therefore properly and truly the discoverer of all the New World: the Northmen who had visited it long before did not promulgate their discovery, and it might as well be given to the aborigina inhabitants of the continent itself as to them. It does not depreciate the merit of Columbus that he could not but suppose he should reach India o China: these were the certainties at which he aimed, and which he would have reached had he not been stopped by the intermediate continen which ought to bear his name. Had Heron, whe he first announced and executed his revolvin boiler, been able to point out that it was a metho of producing force from fuel, which might supply the place of human labour—that all which re mained was adaption—and that skill in the use o this new kind of force would make it a substitut for the strength of men and beasts—it would hav

een difficult to have denied him the title of the scoverer of the steam-engine, and the inventor the first step. Among the consequences of tempting to describe discoveries under too general rms is this, that both things and persons are lowed to clash unnecessarily. The nomenclature science is perplexed by phrases of no precision -as that Newton discovered gravitation, instead a true explanation of the heavenly motions by eans of gravitation—that he first advanced the ue theory of astronomy, which he did in one nse, and Copernicus in another; whence the rovinces of the two are frequently confounded. t must also be noticed that a mere opinion, the sult of choice between several, one or other of hich must have been taken, is confounded with ne same opinion advanced and supported by easons. Thus Philolaus and Aristarchus asserted ne motion of the earth, and Copernicus is said to ve only revived their opinion. The difference etween the two cases lies in this, that the ancient ilosophers merely asserted their belief, the odern one made his hypothesis the means of counting for all the known motions of the eavens, diurnal, annual, and precessional.

The specification, to borrow a term, having een agreed upon, the next question is, what nstitutes a claim to discovery? The answer is, riority of publication. If, as has often happened, vo persons should discover the same thing about ne same time, the one who first publishes is iversally recognised as the discoverer. Of urse, if a fraud can be proved, if it can be tisfactorily shown that the first publisher stole is matter from another, he would not be allowed ne advantage of his wrong: but the onus of roving the fraud lies entirely upon the asserter of , and, until the evidence and verdict arrive, the rst publisher is in possession. The reasons for is rule are not altogether those which exist for ne rule in law. The objects of the latter are the rotection of private rights and public peace; or ther the assignment of private rights in such a anner, as best, in the long run, to promote the elfare of the community, and particularly its eace, without any great shock to the natural elings of equity. But the object of the scientific storian is truth for its own sake; he has nothing o do with conventions made for the sake of peace.

This rule, that first publication gives the right, ntil the contrary is proved, is adopted for the ake of its own probability, as a starting point. elect, at hazard, the name of a result, and of its rst announcer; no doubt will exist in the mind f any one, used to the history of science, that it s at least fifty to one the name of the real dis- overer is thus given. But, if it be *the fact* that he discovery was made at an earlier period, and that fact can be established, the history of the uman mind must not be falsified by adherence o a rule. We insist upon this because we have bserved a tendency in writers of history to esta- lish a rule on legal grounds of peace and con- enience. There is also a confusion between two istinct things; the claims of history, and the laims of the individual: the former demands true acts, the latter just appreciation of his merit.

There is also an injurious tendency to stand by the fixed rule as a thing of good consequences, in the way of punishment or stimulus: and certainly there is no denying that, if it were but right to substitute, in history, the thing which is not for the thing which is, there are advantages arising from the adoption of the rigid rule of first publication. Tartaglia suppressed his method for cubic equations from a selfish motive: Cardan, to whom he had communicated it under promise of secrecy, published it, with a sufficient acknowledgment; nevertheless the rule always goes by Cardan's name. There is little to regret here: Tartaglia was willing, simply that he might he able to puzzle his contemporaries, to retard the progress of algebra; it is not certain that he ever would have published his discoveries. The public has rewarded the individual to whom they were indebted for knowledge by affixing his name to the rules he announced. If it were understood that the name attached to any scientific result was always that of the first publisher, saving all the rights of history over the truth of the discovery, this and similar acts of nomenclature might be a satisfactory use of the *norma loquendi*. It has sometimes happened that individuals have deposited sealed packets with public scientific bodies, to reserve their rights in the event of any one else arriving at results which they wished to avoid making public until they had followed them out to their remote conclusions. This practice is one which would not prevent the name of any other person from being attached to the contents of the packet, if he came independently by the same results, and published them before the packet was opened.

The next question is, what constitutes a sufficient publication? And here the answer is, that the only mode which can give the discoverer no further duty in the matter is the press. If any one should prefer written correspondence, public lectures, or oral conversation, it must be at his own risk. A printed book, pamphlet, magazine, or newspaper, which any one who likes may buy, is a record of the court of history from the day of its appearance: but any other mode of communication, which is of its own nature not addressed to the public at large, must be put in and proved before it can be available. A communication to a scientific body, for example, is only so much better than a letter to a friend, as it is more public and more easily proved: but unless it be published in the transactions of that body, in which case it ranks with a book from the date of publication, it will require subsequent establishment. There is, however, always a difficulty with regard to such communications, particularly when the transactions of the academy in question do not appear till some time after the reading of the memoir. It is impossible to know what an author has added as the paper went through the press: that is, if a contest of dates should arise, it will always be necessary to assume the date of publication, unless some proof can be given that the memoir as published is, in the matter under dispute, the same as that which was originally communicated. It has happened before now, that a communication presented has been almost entirely remodelled before

it was printed. We have little doubt that, in course of time, bodies which publish transactions will find it necessary to require that authors shall either print their communications as presented, or date such additions as they feel desirous of making.

It frequently happens, as before observed, that independent discoveries take place about the same time: there is no doubt that such is the fact. When the publications take place very nearly at the same time, particularly when they are in different countries, it is easy enough to admit the real independence of the two. If the same thing should appear in the notices of the Royal Society and the Comptes Rendus of the French Institute within a few weeks of each other, the presumption is strong in favour of neither writer having had a communication, directly or indirectly, from the other: and this presumption must be rebutted by any one who desires to prove plagiarism. But, as the interval of time becomes greater, the presumption, so far as it is derived from time only, is weakened. In such a case, the internal evidence of the writings themselves must be carefully looked at.

As may be supposed, the most disputed cases are national ones, including in that term the schisms of different classes in the same country, as the scientific feuds of universities, of literary societies, &c. And between people of different countries and governments the question arises in two distinct ways, not only as to the definition of the discovery itself, and the priority of publication, but as to the country to which the discoverer is to be said to belong. And here there seems to us to be a necessity for a distinction which is rarely made, and no wonder; national pride is the mortal enemy of discriminative argument. All people like to believe that their race is gifted by nature with talent, and that their public policy is calculated to draw it out. For proof of this they appeal to their great writers and thinkers, among whom they include all whom they have drawn into their country, and all whom they have driven out. Now it is clear that the eminent men who have been induced to settle in a country not their own may be a credit to the institutions, but can be none to the race, of their adopted country; while those who are driven away may do honour to the race but not to the institutions of the land from which they are exiled. Take the cases for instance of Lagrange and De Moivre. Lagrange, who, of many offers made to him when he left Prussia, perferred that of the king of France, and received, during all governments from the old monarchy to the empire, every possible honour and aid,—is a greater credit to French institutions and feelings than if he had been born in their country. But as far as blood is concerned, he is almost wholly Italian, having been born, and established his first reputation, at Turin: it is said, we do not know on what authority, that his great grandfather was a Frenchman, which may entitle France to claim the eighth part of him. De Moivre, on the other hand, born of French parents and educated in France, was driven from his country by religious fanaticism, and none of his works were published either in France or in French. Whatever credit his talents may do to his race, he is the disgrace of their institutions, as to the time in which he lived.

There is much absurdity in the mode by which national prowess in matters of discovery is tested. A few of the very first names are made the only subjects of comparison. There is some presumption, certainly, that the great names are the best of many, and that the plants most abound where the largest plants are found. But this presumption must not be urged when an attentive consideration will settle the question without it. Archimedes was the greatest of the Greek mathematicians; but Sicily was not therefore the most celebrated in science of all the countries in which Greece had colonised.

The most difficult question of all is undoubtedly what degree of merit belongs to a discovery, and the settlement of the question where in the list it places its author. The public in general judge by utility; whereas it is notorious that many discoveries show more power of mind than others of much greater value to the world. The rule of utility is a good one for mankind in general; but it must be taken with modification by the historian of science. Who has most benefited his species and who has shown himself most above his species in intellect, are two different questions. The merit of the inventor, and his genius, are not comparable quantities. The former is determined by the study, the personal risk or inconvenience which it was requisite to undergo, the patience and perseverance which must have been shown and the goodness of the motive which appears to have actuated. The latter is the greater the less the pain and labour, and is wholly independent of moral considerations. A patient school-boy, who multiplies one number by another with time and care, has more merit than the wonderful youth who have sometimes appeared, and who can do in their heads; but the first has far less mental power, in this one line, than the second. All these things are plain on the first statement; but they are far from receiving due attention, and will so remain until the history of discovery is written without too much deference to popular reputation. We may mention, as a thing to be guarded against, the disposition to depreciate a discovery because it is not something more than it pretends to be, which is frequently combined with a wish to judge of its merit by an arbitrary *à priori* standard of what it ought to have been.

INVERARY. [Argyleshire.]

INVERKEITHING. [Fifeshire.]

INVERNESS, a seaport town and royal burgh, the capital of the county of Inverness, and the principal town of the Highlands, is situated at the southern extremity of the Moray Frith, near the eastern entrance of the Caledonian Canal, 156 miles N. by W. from Edinburgh. The town is of considerable size and well built; the houses are lofty, and many of them elegant. The streets have, since 1831, been paved with granite and hard sandstone brought from the banks of Loch Ness. Common sewers have been constructed, and the town is well lighted with gas, and supplied

with water by means of pipes from the adjacent river. The public buildings consist of three national churches, an Episcopalian church, a court-house, and tolbooth. The last is a handsome modern building with a fine tower terminated by a very elegant spire. The central school-house, situated upon the Green of Muirtown, is also a fine building. Oats are exported in considerable quantity. The foreign annual imports consist of from 400 to 600 tons of hemp, and three or four cargoes of timber and Archangel tar. There is no compulsory assessment for the support of the poor, who are provided for by special quarterly collections, by several charities at the disposal of the magistrates, and from other sources. The population of the burgh in 1841 was 9100. The people in Inverness speak good English. The climate is much milder than might be supposed from the northern position of the town, the mean annual temperature being about 47°. Inverness unites with Fortrose, Nairn, and Forres, in returning one member to parliament. Population of the parliamentary borough of Inverness, 11,568. Population of the parliamentary district, 18,080.

INVERNESS-SHIRE, a maritime county of Scotland, is bounded N. by Ross-shire, S. by the shires of Perth and Argyle, E. by those of Nairn, Elgin, Banff, and Aberdeen, and W. by the Atlantic Ocean. The mainland is comprised between 56° 40′ and 57° 36′ N. lat., and between 3° 50′ and 5° 50′ W. long. The greatest length from N.E. to S.W. is 88 miles, and the greatest width from N. W. to S. E. is nearly 55 miles. The entire county contains about 4600 square miles, of which the main land occupies about 2760 square miles, and the islands about 1840 square miles. The population in 1841 was 97,799. The county sends one member to parliament. It comprehends various districts, particularly that of Badenoch on the S.E., Lochaber on the S., Glenelg on the N.W., besides many inferior districts, such as Glengary, Glen Morrison, Glenshiel, &c. It also comprehends a considerable portion of the Hebrides, or Western Isles, including the Isles of Skye, Harris, Benbecula, North and South Uist, Barra, &c.

This county, which is extremely mountainous, is intersected by innumerable lakes and rivers, and is divided into two nearly equal parts by the deep valley of Glenmore, which runs in a direction from Fort William on the S.W. to the town of Inverness on the N.E. The county forms a large part of the Highlands of Scotland. By far the greater part of the surface is covered with heath; but a good deal of the heathy ground is arable, and a considerable extent of it has been brought into cultivation during the present century.

The prevailing rocks are of the primary class. Gneiss is perhaps the most abundant, but huge masses of granite and of the oldest trap or porphyritic rocks are met with in the Grampians and the mountains of Glencoe and Ben Nevis. Limestone is found in several districts, and in some districts approaches to the nature of marble. Sandstone is also frequently met with. The beds of the stratified rocks are usually highly inclined to the horizon, approaching almost to the vertical.

The two principal mountains are Ben Nevis and Mealfourvounie. The former, which is separated from the Grampians by the desolate tract called the Moor of Rannoch, is composed of porphyry and granite, and rises 4374 feet above the level of the sea. It is easily ascended on the western side. Near its summit the snow lies throughout the year. Mealfourvounie rises 2730 feet above the sea-level. Some veins of lead and silver have been discovered, and also iron ore in small quantities. The soil is for the most part light and sandy, with a subsoil of gravel or clay; but in the neighbourhood of the town of Inverness it is enriched by a fine loam deposited by the waters which fall into the adjoining frith. The principal rivers are the Spey, the Ness, and the Beauly, in all of which there are valuable salmon-fisheries.

Formerly there were a great number of small arable farms only a few acres in extent; but these have much decreased since the introduction of sheep-farming. The attention of the farmers is chiefly directed to the rearing of sheep and cattle. The sheep are mostly of the Cheviot and Linton breeds. The fields are frequently inclosed, and of late years a great deal of waste land has been drained and reclaimed, and much ground planted. The fir woods in Glenmore and those of Strathspey in the adjoining county of Elgin are supposed to be more extensive than all the other natural woods in Scotland together. Glen Morrison, which opens into Glenmore, also contains much fine timber. Those which grow naturally are the oak, fir, birch, ash, mountain ash, holly, elm, hazel, and the Scotch poplar. Those which are planted are the larch, spruce fir, silver fir, beech, plane, and fruit-trees. In these forests and the neighbouring mountains the herds of red and roe-deer roam in safety in recesses almost impenetrable to man. The alpine and common hare and other game are also abundant.

Formerly a good deal of hemp, worsted, and linen yarn was made in this county; but this has greatly declined since the establishment of the large manufactories of the south.

The Glenmore, or Great Glen of Albion, as it is sometimes called, which stretches across the county from Fort William to the town of Inverness, is partially covered by three lakes, Loch Lochy, Loch Oich, and Loch Ness, which lie nearly in a straight line between the above-mentioned limits. Their aggregate length is 37 miles, and the entire distance between Fort William and Inverness is 60 miles. In 1802 Mr. Telford was appointed by the commissioners of the Treasury to make a survey of these lakes and of the adjoining country preparatory to the cutting of a canal. His report was made in the following year, and the works were in full operation in 1805, but the whole line of navigation was not opened till the latter end of the year 1822. The expense of constructing the Caledonian Canal, as it is called, was defrayed by government. That part of the navigation which is not upon the lakes is 22 miles and 1628 yards in length: it is 50 feet wide at the bottom and 15 feet deep. Loch Oich is the summit-level of the canal, and its elevation is 94 feet above the level of the sea on the east

coast, at high water. The entire cost was 986,924*l.*, to which must be added a portion of the annual expenditure since the opening of the navigation, which has hitherto exceeded the produce of tonnage dues.

The only town of importance is INVERNESS, the capital of the county.

INVERSE, INVERSION. Any two operations of algebra are said to be inverse when one of them undoes, so to speak, the effect of the other; so that, if both be successively performed upon the same quantity, the result is that quantity itself. For instance, the operations implied in $1 + x^2$ and $\surd(x-1)$ are inverse to one another; for

$$1 + \{\surd(x-1)\}^2 = x, \quad \surd(1+x^2-1) = x.$$

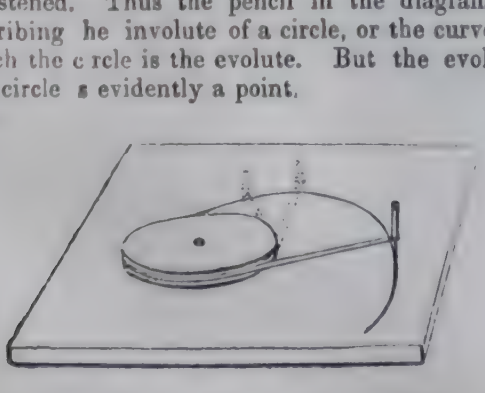
We need do no more than name addition and subtraction, multiplication and division, raising of powers and extraction of roots, as pairs of inverse operations.

INVERSION, in Music, is a change in the relative position of two sounds, or of the several notes of a chord. Thus C D, an interval of a 2nd, becomes by inversion (D C) a 7th.

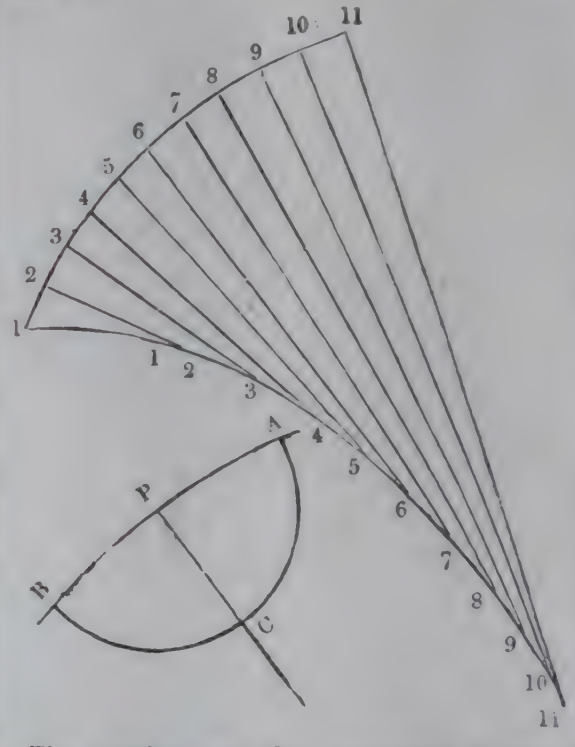
INVERURY. [ABERDEENSHIRE.]

INVOLU'CRUM, in Botany, is any collection of bracts round a cluster of flowers. In umbelliferous plants it consists of separate narrow bracts placed in a single whorl; in many composite plants these organs are imbricated in several rows.

INVOLUTE AND EVOLUTE (the curve unrolled and the curve from which it is unrolled), a name given to two curves so formed and placed, that, supposing the second to be cut out from solid matter, the first can be formed by fastening one end of a thread upon a point in the second, attaching a pencil to the other end, and moving the pencil so that the thread may either gradually enwrap or be unwrapped from the curve to which it is fastened. Thus the pencil in the diagram is describing the involute of a circle, or the curve of which the circle is the evolute. But the evolute of a circle is evidently a point.



Every curve has one evolute, and an infinite number of involutes. The proper name for curves described from the same evolute is *parallel curves*, since they have the fundamental property of parallel lines: for they never meet, though (if they admit of it) ever so far produced; a straight line perpendicular to one is always perpendicular to the other; and the part of the perpendicular intercepted is always of the same length. When arcs of parallel curves are required to be laid down, the most commodious method of proceeding is to construct the evolute of one of the arcs approximately, as follows. On the arc draw tangents at moderately small distances, and draw perpendiculars to those tangents. The parts of the tangents cut off from each by its neighbours will together give the arc of the evolute near enough for all purposes. And it may be well to notice that it will be a sufficiently accurate method of drawing the perpendicular to the tangent at a point P, if we take a small circle whose centre is P, bisect the arc A C B in C, and join and produce P C.



The angular error thus committed is only a small portion of the angle made by the tangents at P and A.

INVOLUTION AND EVOLUTION. In the articles of this name in the 'Penny Cyclopædia' and its 'Supplement;' Young's work on the 'Solution of Equation;' Davies' edition of Hutton's 'Course of Mathematics;' the appendix to De Morgan's 'Arithmetic;' and an article in the 'Companion to the Almanac' for 1839, and other places, the reader will find an account of the method which is now beginning to find its way into general use, in this country at least, under the name of Horner's method. It is impossible to give any detailed account of it in this work; but the following brief statement may excite the curiosity of those calculators who are yet strangers to the greatest step in pure arithmetical process which has been made in modern times.

Involution commonly means the raising of powers; evolution the extraction of roots. Extend the first word so as to allow of its embracing the cases in which given additions are interspersed among the multiplications; for instance, call $\{(x+1)x-2\}x+3$ an involution of the third order as well as xxx; and then the inverse process, evolution, will be, when found, the solution of numerical equations.

Before the time of Vieta there was no organised evolutionary process, consisting in the determination of figure after figure of the answer, except

only common division and the extraction of the square root. In the year 1600 Vieta published an extension of this process, by which, with no small difficulty of operation, the numerical solution of all equations was put upon the same footing as the equation of the first degree, and one kind of equation of the second degree, are put on, in the two rules above mentioned. This rule was little used on the continent and very much in England, where Briggs, Harriot, Wallis, Oughtred, and others, paid great attention to it. Briggs, in particular, applied to it a modification which gives him the right to what was afterwards called *Newton's Method*, and used it extensively in preparing his celebrated 'Trigonometria Britannica.' But, owing to its difficulty of operation, the method called Newton's, with no other organisation than belongs to the conversion of any algebraic formula into numbers, gradually superseded it. It was thus so completely lost that very few mathematical writers ever mentioned its existence. In 1807, Alexander Ingram, in an edition of Hutton's Arithmetic, gave a method of extracting the cube root, which is really the proper extension of arithmetical evolution to that case: the old method of extracting the cube root was no more than is found in Vieta's extension.

In 1819, W. G. Horner, a schoolmaster at Bath, a mathematician of talent—and in one branch of invention, namely, the invention of organised methods in place of rough and unformed processes, of talent which has never been exceeded—communicated to the Royal Society the process of evolution which applies to all equations, and completes the main rules of arithmetic. He did not know of Vieta's method, which he reinvented as part of his own: he did not even know the step which Ingram had made. His addition to Vieta consists in the formation of a process by means of which all that has been done to secure one figure of the solution is so much help towards the acquisition of the next. The reader will find the history of the invention, and of some curious attempts to deprive the right owner of it, in the articles of the 'Companion to the Almanac,' and the 'Supplement to the Penny Cyclopædia' above noticed. The first elementary writer who noticed the method, was Mr. Young, in a work on Algebra, published in 1823. The late Dr. Olinthus Gregory saw the value of it very early; but those to whom it will be useful are much indebted to Mr. T. S. Davies, of the Royal Military Academy, Woolwich, the friend of Horner and the legatee of his papers, both for the exertions he has made to introduce it, and for his publication of other papers by Horner, in which much is done to systematise the operations of algebra.

This method is gradually working its way into general use. Operative processes are difficult of introduction: old mathematicians rarely learn new ones after their habits are settled, and younger men have not the same power of introduction. Those however who are curious on the solution of equations should not allow themselves to remain in ignorance of a method by which a beginner, as a college exercise, has carried the solution of a cubic equation past one hundred places of figures. (See, when it appears, vol. iii., No. 6, of the 'Mathematician.')

INWOOD, the family name of three architects, father and two sons, who constructed many public and private buildings in London and elsewhere.

William Inwood was born about the year 1771. He was brought up to the professions of architect and surveyor. He was employed as steward to Lord Colchester, was surveyor to a large number of persons, and several architects now living were instructed by him. He died March 16, 1843.

Henry William Inwood, the eldest son of William Inwood, was born May 22, 1794. He was several years in Greece, and examined with great care the architectural remains at Athens and elsewhere. He assisted his father in most of his architectural pursuits, especially in designing and constructing St. Pancras Church, New Road, London. The exterior of the body of the church is, with certain necessary deviations, an imitation of the Ionic temple called the Erectheion, on the Acropolis at Athens; the tower is an adaptation from the building commonly called the Tower of the Winds, also at Athens, which is properly the Horologium, or water-clock, of Andronicus Cyrrhestes. The semicircular apsis at the east end of the church supplies the place of the straight west wall of the Pandrosion, or temple of Pandrosos, which adjoined the Erectheion at the west end. The two covered buildings which project from each side of the east end, forming the entrances to the catacombs of the church, are adaptations from the south portico of the Pandrosion. In the interior the galleries are supported by very elegant slender columns. The ceiling is flat, and formed into a number of ornamented pannels. The general effect of the interior is good, though rather deficient in light, especially below the galleries, from the small size of the windows. H. W. Inwood died March 20, 1843, when the ship in which he had sailed for Spain was wrecked, and all on board perished.

H. W. Inwood published in 1827 'The Erectheion at Athens, Fragments of Athenian Architecture, &c., illustrated with Thirty-nine Plates.'

Charles Frederick Inwood, second son of William Inwood, born Nov. 28, 1798, besides assisting his father in the Westminster Hospital, and some other works, was the architect of the church of All Saints at Great Marlow, in Buckinghamshire, which was completed in 1835, and a few other buildings of little importance. He died in May 1840.

IODINE, a non-metallic elementary body, discovered by M. Courtois in 1812. Iodine exists in the water of the ocean and mineral springs, and in marine molluscous animals and sea-weeds; but it is principally obtained from *kelp*, or sea-weed which has been burnt for the purpose of obtaining alkali.

Iodine is a soft opaque solid, of a blueish black colour and metallic lustre. The primary form of the crystal is a right rhombic prism, and the crystals are usually flat. According to Gay-Lussac, its specific gravity is 4.948. When moderately heated, it rises in vapour of a violet colour, and hence its name from the Greek ἰώδης. On cooling, it again crystallises unchanged, nor is it

decomposed or altered by being subjected to very high temperatures, and it has resisted all attempts to decompose it. Iodine has a strong disagreeable odour and taste; it stains the skin of a brownish colour, but not permanently. It is readily dissolved by alcohol, but scarcely at all by water. It is very poisonous. Its characteristic property is that of giving an intense blue colour when added to a solution of starch. It unites with metals to form compounds, which are termed *Iodides*, and, like chlorine and bromine, it forms acids both with hydrogen and oxygen.

Oxygen and Iodine combine to form three or four compounds. One of these, *Oxide of Iodine*, is said by Sementini to be a soft yellow substance, which by an addition of oxygen becomes *Iodous Acid*, a yellow liquid; but very little is known of these substances. *Iodic Acid* ($O^5 I^1$) is a white semitransparent solid substance, inodorous, but astringent. It is so dense as to sink in sulphuric acid, and it deliquesces in a moist atmosphere. It is very soluble in water; the solution reddens vegetable blue colours; it detonates when mixed and heated with charcoal, sugar, and sulphur. It combines with metallic oxides to form salts, which are termed *Iodates*. *Oxiodic* or *Periodic Acid* ($O^7 I^1$) is a crystalline substance, easily resolvable by heat into its elements. *Nitrogen and Iodine* form *Iodide of Nitrogen*, which is a dark brown powder, very explosive: it consists of $N^1 I^3$. *Hydrogen and Iodine* form *Hydriodic Acid*, which has a sour taste, reddens vegetable blues, and when mixed with atmospheric air forms dense white fumes with its moisture. It is soluble in water. The salts which it forms are termed *Hydriodates*. It consists of $H^1 I^1$. *Chlorine and Iodine* appear to form three *chlorides;* but the opinions of chemists are not quite determined as to their nature. *Sulphur and Iodine* combine to form a *sulphuret*, which is a dark substance, easily decomposed by heat. *Phosphorus and Iodine* combine to form three compounds: one ($P^1 I^1$) is an orange-coloured substance, which sublimes when heated; another ($P^2 I^3$) is a dark gray crystalline mass, which fuses at 84°; a third ($P^2 I^5$) is a black substance, fusible at 114°. *Iodine and Carbon* unite to form two compounds, which are not yet well known.

The compounds of iodine and metals are mentioned under the names of the metals.

Medicinal Properties of Iodine. — Iodine, though only obtained in an isolated state of late years, has been long employed as the efficient principle of other preparations and therapeutic agents, namely, burnt sponge and certain mineral waters. It is only since it has been procured as a distinct principle that its action has been ascertained with precision. In the present day it is administered rather in some artificial compound than as pure iodine, owing to its very sparing solubility in water.

The diseases in which it has been found useful are glandular swellings, especially bronchocele or goître, which rarely resists its action; in some strumous diseases; in chronic rheumatism; and also as an antidote in instances of poisoning with strychnia, brucia, and veratria; but its claims to confidence are not clear as to these formidable poisons.

IONA, also known by the names of Icolmkill and Hy, or I, is one of the Hebrides belonging to Argyleshire. It is situated on the western side of the Isle of Mull, from which it is separated by a narrow channel called the Sound of I. Its length is 3 miles, and at its widest part it is about 1½ mile in breadth. The general aspect of the country is rugged and mountainous, and the surface for the most part consists of moor and bog, occasionally varied by a patch of green pasture. The village of Bonessan is a collection of huts inhabited by about 250 people.

A religious establishment was founded on the island by Columba, a native of Ireland, about the year 563. This was an establishment of Culdees, not subjected to vows, but governed by a code of laws formed by Columba; and it so continued for several centuries, with the highest reputation, not only for sanctity, but for learning. The remains of 48 Scottish kings, 4 Irish kings, and 8 Norwegian kings, were interred there. For about 200 years it was a bishopric under the kings of Norway. When the papal power was established in Iona, the monastery became a Benedictine abbey. In 1507 the abbey of Iona was annexed to the diocese of the Bishop of the Isles. In 1561 the whole of the ecclesiastical buildings were demolished. The revenues of the monastic institutions were united to the see of Argyle, and upon the abolition of episcopacy they became the property of the Duke of Argyle. The island is now chiefly interesting on account of its numerous architectural and other antiquities, a full account of which is given in Dr. Macculloch's 'Highlands and Western Isles of Scotland.'

IONE', or JONE', a parasitic genus of minute crustaceans, placed by Desmarest under the *Isopoda*, but by Latreille under the *Amphipoda*.—Example, *Oniscus thoracicus*, Montagu, in 'Linn. Trans.,' ix. iii. 3, 4. This parasite hides itself under the shell of *Callianassa subterranea*, and there forms a tumour on one of its sides.

IO'NIA and IONIANS, a people belonging to the Greek or Hellenic race. Herodotus (viii. 44) says that the Athenians were Pelasgi, and that they took the name of Iónes from Ion, the son of Xuthus. The name only occurs once in the Iliad and under the form Iáones. The Ionians at some unknown early period occupied the northern part of the Peloponnesus, along the Corinthian Gulf, and their country was called Ionia. When the Dorians invaded the Peloponnesus, about B.C. 1100, the Achæi [ACHÆI] took refuge in Ionia, which from that time was called Achæa, and the Ionians emigrated to Attica, but this emigration was probably gradual. From Attica there was a great emigration of Ionians and others under the sons of Codrus, the last king of Athens, which is called the great Ionian emigration: but there may have been various emigrations at different times. The Ionians established colonies in many of the Cyclades, such as Naxos, Andros, Paros, and Delos, and also in Eubœa. The emigrants who proceeded to the coast of Asia, under the

leader Neleus, took Miletus, which was then inhabited by the Carians. They also took other towns on the same coast, which, with the islands of Chios and Samos, ultimately formed the confederation of the twelve cities of Ionia. Smyrna being seized by Colophonian exiles (according to Herodotus), was added to the confederation.

This confederation was united by a common religious worship and the celebration of a periodical festival. The place of assembly was the Panionium, at the foot of Mount Mycale, where a temple, built on neutral ground, was dedicated to Poseidon. We have no materials for a history of these cities of Ionia as a political community, and no reason for supposing that their political union came near the modern notion of a federation.

Asiatic Ionia extended from the Cumæan Gulf on the north to Mount Grius and the Gulf Basilicus, south of Miletus, a length of not more than 100 miles in a straight line, but with a coast three times that length, owing to the many sinuosities and the form of the large Chersonesus opposite Chios. The Ionian territory did not extend inland above 40 miles from the coast as far as Mounts Sipylus and Tmolus. The principal rivers of Ionia were the Hermus, the Caystrus, and the Mæander.

The Asiatic Ionians early attained a high degree of commercial and maritime prosperity. Miletus alone is said to have founded 75 towns or colonies. They became wealthy and luxurious. The remains of their monuments prove their taste for the arts, and their temples and public buildings rivalled those of European Greece. The literature of Greece may be said to have originated on the coast of Asia Minor. The historian Hecatæus was a native of Miletus; Thales, one of the earliest philosophers, was from the same country. Anacreon was a native of Teos; and Herodotus, though a Dorian, adopted, in his History, the language of his Ionian neighbours.

The subjection of the Ionians to the Lydian kings, their conquest by Cyrus, B.C. 546, and their subsequent struggle with the power of Persia, are the chief events in their history to B.C. 479, the date of the battle of Mycale. From that time their history is connected with that of Athens and Sparta, until the peace of Antalcidas, B.C. 387, by the terms of which the Asiatic cities were given up to Persia. Their subsequent history under Alexander and his successors can be very obscurely traced. Under the Roman empire several of the cities of Ionia still maintained the rank of wealthy cities, such as Smyrna and Ephesus. The best account of the actual state of the remains of the Ionian cities is in Chandler's *Travels in Asia Minor* and the *Ionian Antiquities*, published by the Dilettanti Society, 2 vols. fol., with handsome plates.

IONIAN ISLANDS, the collective name given to the islands of Corfu, Cephalonia, Zante, Santa-Maura, Theaki, Paxo, Cerigo, and some small islets, all situated in the Ionian Sea, off the west coast of Albania and the coast of Greece. The area and population of the seven principal islands are as follows:—

	Area in sq. miles.	Population in 1844.
Corfu	227	64,676
Cephalonia	348	69,984
Cerigo	116	11,694
Santa-Maura	180	18,676
Paxo	26	5,017
Theaki	44	10,821
Zante	156	38,929
Total	1097	219,797

The islands rise in irregular rugged abruptness from the sea, and their structure consists chiefly of limestone, gypsum, and sandstone. Oil, wine, corn, some cotton, the small species of grape called currants, and other fruits, and flax, are the chief productions; the olive is extensively cultivated in all the islands; the currant is grown in the greatest perfection in Cephalonia and Zante, but of late years the cultivation of this fruit is diminishing in the islands and increasing on the main land of Greece. Earthenware, salt, soap, and some coarse woven goods, are the principal industrial products; ship-building and the fisheries give employment to a considerable number of hands. The coasting trade is important. The imports, consisting of sugar, coffee, and drugs; raw and manufactured cotton and silk; wool and woollen cloth, glass, hardware, staves and hoops; iron, timber, wheat, Indian corn, rice, cheese, flour, fish, cattle, sheep, tobacco, &c., average in value about 630,000*l.* a year. The import and export is almost entirely carried on in British ships. Two steamers under the flag of the Republic of the Ionian Islands ply between the islands.

The climate of the Ionian islands is mild and healthy; the winters are rainy, and attended by boisterous winds; the heat in summer is moderated by the north-east wind; it is only when the sirocco blows that any inconvenience is experienced from the heat. Shocks of earthquake are often felt in winter, especially in Zante.

The form of government is that of an Aristocratic Republic, under the protection of Great Britain, represented by a lord high commissioner, who resides in the city of Corfu, the capital of the Republic. [CORFU.] The executive power is lodged in a senate of six members, including the president, who is named by Great Britain on the recommendation of the lord high commissioner; the other 5 senators are elected by the legislative assembly from amongst its own members, subject to the approval of the lord high commissioner. The legislative assembly consists of 40 members including the president; of these 11 are chosen by the lord high commissioner, and form the Primary Council; the 29 others are chosen by the electoral body (synclité) of each island in proportion to its population from a list of candidates furnished by the Primary Council. The assembly elects its own president, who however must be approved of by the lord high commissioner. The assembly is elected for five years; laws passed by it must, before execution, receive the sanction of the senate and of the lord high commissioner, in whom a

power of *veto* rests. In 1844 the expenditure amounted to 143,198*l.* 7s. 10d.; the income to 120,236*l.* 10s. 10d.; the amount of the public debt is not known. The lord high commissioner is also commander-in-chief of the British troops which, to the number of about 3,000 men, garrison the islands. An English frigate and war steamer are kept at Corfu. There is a university and an ecclesiastical college for clergy of the Greek church at Corfu; and each of the islands and chief towns has a school, in which ancient Greek and Latin, modern languages, and mathematics, are taught. Besides these educational establishments, all of which are supported from the revenue, there are numerous district schools.

About four-fifths of the whole population are of the Greek Church, and are under the spiritual government of an exarch or primate, which office is held for five years in rotation by the Greek Archbishops of Corfu, Cephalonia, and Santa-Maura; each island has besides its own archbishop or bishop. The rest of the population, with the exception of some of the British residents, and about 5000 Jews, are Catholics, who are superintended by one archbishop and two bishops. The language of the islands is modern Greek. The inhabitants are of Greek and Albanian descent, with a considerable admixture of Italian blood.

Cephalonia and *Corfu* have been noticed under separate heads.

Cerigo, the ancient *Cythéra*, the fabled birthplace and resort of the goddess Venus, is now the place of banishment for the convicts of the other islands, and presents a rocky and barren aspect. It is the most southern of the islands, lying E. of Cape Matapan, and is traversed nearly through its centre by the meridian of 23° E. long. The chief products are corn, wine, oil, raisins, honey, and wax; some cotton and flax are also grown; a great number of goats are fed. Some remains are shown, near the chief town Capsali (population 5000), which are stated to have formed part of the temple of Venus, mentioned by Pausanias.

Santa-Maura, the *Leucas* of the ancient, and the *Leucadia* of the modern, Greeks, lies nearly opposite the entrance of the Gulf of Arta, and is 20 miles long by from 6 to 10 wide. It is separated from the main land by a long narrow channel navigable only for canoes (monoxyla), and consists of a range of mountains, terminating northwards in a flat peninsula, and southwards in the Leucadian promontory or Cape Ducato, about two miles N. by W. of which is the rock called Sappho's Leap, whence the lovelorn poetess is said to have plunged into the sea, a depth of 200 feet. The east side of the island is barren; the north and west parts consist of a rich soil, and are very productive. The olive, the vine, and other fruit trees, are the principal objects of cultivation: corn is produced, but not in quantity nearly enough for the consumption; the fisheries and the manufacture of salt are a great source of employment to the inhabitants, many of whom emigrate to the main land in harvest time to work. The chief town of the island, *Amaxichi*, or *Santa-Maura*, is unhealthily situated on the low peninsula in the north of the island; it is much resorted to for the purchase of manufactured goods, which are supplied chiefly from Malta. On an islet N. of the town stands the Castle of Santa-Maura, which is the head quarters of a British regiment, and is joined to the town by a causeway, constructed on 365 arches, over the salt lagune that separates the island from the main. In the mountains, the highest of which is St. Elias (3000 feet above the sea), game is abundant, and the lagunes swarm with pelicans and almost every species of waterfowl. The antiquities are the tomb of Artemisia and the ruins of the town of Leucas.

Paxo lies S. of Corfu; it is only about five miles long, and scarcely two broad; the surface is rocky, mountainous, arid, and deficient in water. The principal produce is oil, which is of excellent quality. The chief place is *Porto-Gayo*, a mere cluster of houses built on the shore.

Theaki, the ancient *Ithaca*, lies E. of Cephalonia, from which it is separated by a long narrow strait. It is 18 miles long and 4 broad at its widest part; but it is deeply indented about the middle of its length on the eastern side by the beautiful Bay of Vathi, between which and the channel of Cephalonia is a narrow isthmus that unites the northern and southern parts of the island. The limestone range, which runs through its whole length, rises everywhere into rugged eminences, so that the surface of the island is entirely destitute of plains and valleys properly so called, there being scarcely one hundred yards of continuous level ground in the island. The soil is light and shallow; yet olives, currants, fruits, wine, and some corn, are raised by the industrious population. The honey of Ithaca is much esteemed. The climate is renowned for its salubrity; the inhabitants commonly reach 80, 90, and not unfrequently 100 years of age. *Vathi*, the chief town, stands on the shore of the little bay of Dexia, an inlet from the Bay of Vathi, and has 2500 inhabitants. The chief antiquities of the island are the cyclopean walls, named the castle of Ulysses, which stand on Mount Aito, in the isthmus before mentioned. The rocky surface of the island presents numerous caverns, to which the shepherds and their flocks retire by night.

Zante, the *Zakynthos* of the ancient and modern Greeks, situated about 10 miles S. of Cephalonia, and 15 W. of the Morea, is a beautiful and fertile island. It is about 20 miles long, and consists chiefly of an extensive plain that stretches from the north to the south coast, with a breadth of 6 or 8 miles, and terminates westward in a range of hills running parallel to the coast, and eastward in Mount Skopo and the hills about the city of Zante. The products are similar to those of the other islands, but more abundant. The wine of Zante is of superior quality, and in great request all over the Levant. The great trade of the island is in *currants*, the fruit of a dwarf vine originally brought from Korinth, whence the name. The *Petroleum or Pitch Wells*, described by Herodotus (iv. 195) are about 12 miles S. from the town of Zante, in a marshy district, near the shore of Chieri Bay, in the south-eastern part of

the island They produce about 3 barrels a day. Another well, called the *Tallow Well*, is in a cavern on the shore. There are very few remains of antiquity in the island. *Zante*, the largest, most populous, and most commercial town of the Ionian Republic, stands at the head of a bay on the east coast of the island. The population is 24,000. The streets are narrow, as in all warm climates; the houses are well built, chiefly in the Italian or Venetian style. The churches are numerous, and richly ornamented. There are two piazzas or squares, in one of which is erected a handsome monument to Sir Thomas Maitland. The harbour is protected by a mole; but it is much less secure than those of Theaki and Cephalonia. From the citadel, which stands on the highest part of the town, there is a magnificent view over Cephalonia, the Gulf of Lepanto, and the coast of the Peloponesus. Zante is the seat of a Greek archbishop and of a Catholic bishop; it has a theatre, a custom-house, and an arsenal. The city has frequently suffered from earthquakes; those of Dec. 29, 1820, and Jan. 19, 1825, were very destructive.

The smaller dependent islands are *Merlera* and *Fano*, which lie N.W. of Corfu; *Anti-Paxo* S.E. of Paxo; *Kalamo* and *Meganisi*, E. of Santa-Maura; and *Cerigotto*, which lies S.E. of Cerigo, and is the most southern, as well as the most eastern possession of the Republic.

IONIAN SCHOOL comprises several of the earliest philosophers of Greece, whose speculations were chiefly of a physical character, and who, with one or two exceptions, were natives of the Ionian colonies in Asia Minor.

IONIC DIALECT, one of the four written varieties of the Greek language, was spoken in the Ionian colonies of Asia Minor, and in several of the islands of the Ægean Sea. As the new Ionic, it is distinguished from an older, which was the common origin of itself and the Attic. The old Ionic was widely diffused, and its use was coextensive with the Ionian settlements in the Peloponnesus and Northern Greece. The language of epic poetry arose out of this original tongue, which after the Dorian conquest passed, on the one hand, with the fugitives into Asia Minor, while, on the other, it continued to be spoken, for awhile at least, by the conquered peasantry who remained in Greece Proper. Herodotus (i. 142) distinguishes four varieties of the new Ionic, in one of which he wrote, and, though a Dorian, has left us the best and most complete specimen of it.

IONIC ORDER. [Civil Architecture.]

IONI'DIUM, a genus of violaceous plants inhabiting the tropical parts of America. Several species are used medicinally. *I. Ipecacuanha* and some others have emetic roots.

IOWA, one of the United States of North America, had its boundaries thus defined by an Act of Congress passed Aug. 4, 1846. From the mouth of the Des Moines River up the main channel to the N. boundary of Missouri; thence W. along the said boundary to the Missouri River; thence up the Missouri River to the mouth of the Big Sioux River; thence up the Big Sioux River to the parallel of 43° 30′ N. lat.; thence E. along the said parallel to the Mississippi River; thence down the Mississippi to the place of beginning. We cannot state the area of the State as thus defined. The area of the territory was about 150,000 square miles. The population in 1845 was 81,920.

Of the northern part of the State a very large portion is occupied by a vast extent of high ground called the Coteau des Prairies. This huge mass, which is said to rise more than 1000 feet above the surrounding country, has generally a rounded surface, with few irregularities, and is for the most part destitute of trees. East of the Coteau des Prairies is an extensive valley, in which the Red River runs N. to Lake Winnipeg, and the St. Peter's River S.E. and then N.E. to the Mississippi. West of Coteau des Prairies is a broad valley of prairie land traversed by the James River, and this valley is separated from the Missouri by a high range of ground similar to the Coteau des Prairies. The upper parts of both of these great river-valleys have been estimated to be more than 1000 feet above the level of the sea. The rest of the country between the Mississippi and the Missouri consists of rounded sweeps with broad valleys in which rivers flow. Belts of forest occur near the rivers, especially contiguous to the Mississippi and the Missouri, but the rest of the country either consists of prairies or is covered with brushwood. The south-east part of the state, which is the only part in which the settlers are numerous, is generally undulating, interspersed with timber-lands and prairies, and abounding in springs and streams.

In Iowa there are numerous rivers, which, rising in the elevated grounds of the northern parts of the territory, flow respectively eastward into the Mississippi, westward and southward into the Missouri, and northward into the British possessions. James River has a course S. of upwards of 400 miles, and falls into the Missouri. Of the rivers which fall into the Mississippi, one of the largest is the Des Moines River, which is navigable for 300 miles from its mouth. Next in size is the St. Peter's River, with its numerous tributaries, which flows about 300 miles S.E., then about 200 miles N.E., and falls into the Mississippi a little below the Falls of St. Anthony. The Skunk River, the Lower Iowa, with its affluent the Cedar River, the Wabepisipimecon River, the Great Macquoquetois River, the Turkey River, and the Upper Iowa are also rivers of large size. Of the rivers which flow northward the Red River is the largest; it has a course of from 300 to 400 miles northward before it enters the British possessions, through which it flows to Lake Winnipeg. In the most northern and north-eastern part of the State the country is flat and swampy, and there are numerous lakes. There is a lead-mine district in the south-eastern part of the State, and considerable quantities of the metal are obtained.

There are no towns yet of sufficient size to require description; the largest are Burlington, Bloomington, Iowa city, Du Buque, and Fort Madison. Iowa, the capital, is in 41° 28′ N. lat., and 13° 45′ W. long. from Washington.

Iowa was constituted a State by an Act of Congress, dated Aug. 4, 1846. It is to send 2 representatives to Congress till the next census. The legislature consists of 19 senators and 39 representatives. The senators are elected for 4 years, and the representatives for 2 years.

IPECACUANHA is an emetic substance, the root of several plants growing in South America. All the kinds have nearly the same ingredients, but differ in the amount of the active principle which they respectively contain, termed emeta. The best is the annulated, yielded by the *Cephaëlis Ipecacuanha*, a small shrubby plant, native of Brazil and of New Granada. Of this sort there are three varieties, namely, the brown, red, and gray, or gray-white, called also greater annulated ipecacuan. As this is the only sort sent from Rio Janeiro, it is sometimes called Brazilian or Lisbon ipecacuanha. It is sent in bales and barrels.

The dust or powder of ipecacuan applied to any mucous surface causes irritation and increased secretion from the part. It is chiefly employed to excite the stomach either to augmented secretion, or to invert its action, and effect vomiting. It is also capable, by being combined with other substances, of being directed to the skin, and producing increased perspiration.

IPHICRATES, an Athenian general, who introduced a happy innovation upon the ancient routine of Greek tactics, during that general war which was ended B.C. 387 by the peace of Antalcidas. Iphicrates laid aside the weighty panoply which the regular infantry, composed of Greek citizens, had always worn, and substituted a light target for the large buckler, and a quilted jacket for the coat of mail; at the same time he doubled the length of the sword, usually worn thick and short, and increased in the same, or by some accounts in a greater proportion, the length of the spear. It appears that the men also carried missile javelins, and that their mode of attack was to venture within throw of the heavy column, the weight of whose charge they could not have resisted, trusting in their individual agility to baffle pursuit. When once the close order of the column was broken, its individual soldiers were overmatched by the longer weapons and unencumbered movements of the lighter infantry. In this way Iphicrates and his targetiers (peltastæ) gained so many successes that the Peloponnesian infantry dared not encounter them, except the Lacedæmonians, who said that their allies feared the targetiers as children fear hobgoblins. They were themselves taught the value of this new force, B.C. 392, when Iphicrates waylaid and cut off nearly the whole of a Lacedæmonian battalion. Iphicrates afterwards commanded in the Hellespont, B.C. 389; in Egypt, at the request of the Persians, B.C. 374; relieved Corcyra in 373, and served with credit on other important occasions.

IPOMÆA, a genus of plants of the natural family of *Convolvulaceæ*, which is very closely allied to Convolvulus, or Bindweed. The species are very numerous, and found in the tropical parts of Asia, Africa, and America. A few ascend the mountains in such latitudes.

Like the kindred genus Convolvulus, which affords us scammony, many of the species of Ipomæa are useful for their purgative properties: thus the Jalap plant is of this genus. [CONVOLVULUS JALAPA.]

I. Jalapa is a species which has not long been accurately determined, though its root has so long and so extensively been employed as a powerful medicinal agent.

IPSAMBUL. [ABOUSAMBUL.]

IPSWICH. [SUFFOLK.]

IRAK ARABI. [BAGDAD.]

IRAWADDY. [BIRMA.]

IRELAND lies west of Great Britain, in the Atlantic Ocean, between 51° 25′ and 55° 22′ N. lat., and 5° 27′ and 10° 35′ W. long. The arm of the Atlantic, which separates Ireland from Great Britain, is called the *North Channel*, at its northern part; the *Irish Sea*, opposite Lancashire; and *St. George's Channel*, opposite Wales. It varies from 14 miles in width, opposite Antrim, to 120 miles opposite Louth. The remainder of the coast-line on the north-west, west, and south-west is formed by the Atlantic Ocean. The island is 245 miles from N. to S., by about 200 from E. to W. Its area is 32,511 square miles, or 20,807,040 acres.

General Features.—The general form of the island is that of an oblique parallelogram. The south-westerly portion, which is most exposed to the Atlantic, is deeply indented with arms of the sea penetrating between rocky promontories: the western shore in general is lofty and precipitous, and the eastern flat and little indented.

The most remarkable feature in the distribution of high and low land over the surface is the great limestone plain which occupies, with little interruption, almost the whole of the central district extending from the sea at Dublin on the east to the bay of Galway on the west, and from the counties of Sligo and Fermanagh on the north to the confines of Cork and Waterford on the south. The chief mountain-groups are either external to this plain, or rise in insulated ridges near its borders. The principal among them are the following:—Wicklow granite range; Gaultees of Tipperary; Slievenaman and Knockmildown ranges of Tipperary and Limerick; Mount Brandon in Kerry; and McGillicuddy's Reeks, in the same county. These latter are the highest summits in Ireland, 3404 feet.

A primitive ridge of mica-slate and granite prolongs this district to within a short distance of the borders of Donegal, where it subsides, to rise again in that extended primitive formation which occupies almost all the county of Donegal and a great part of the counties of Derry and Tyrone. This district is succeeded on the east by the great trap-field of Antrim, which overlies it through an extent of nearly 800 square miles. The clay-slate tract which succeeds the trap-field on the south and west contains the granite group of the Mourne Mountains and the granite and greenstone group of Slieve Gallion.

The limestone plain likewise contains six coal districts: the Leinster, or Castlecomer district; the Slieve Arda, or Tipperary district; the Mun

ster district; the Lough Allen district, round the source of the Shannon; and the Monaghan and Tyrone districts; there is also a coal district of small extent in Antrim. The coal raised in the southern districts is anthracite, or blind-coal; that raised in the districts north of Dublin is bituminous.

In addition to these the central district of Ireland contains upwards of one million acres of bog, comprehended for the most part within that portion which would be embraced by lines drawn from Wicklow to Galway, and from Howth-head to Sligo. Numerous ridges of limestone-gravel, called Eskers, surrounding these several divisions, offer an unlimited supply of the material best adapted for their improvement.

Rivers and Lakes.—From the arrangement of the mountain groups round the borders of the central plain, the courses of the greater number of the rivers of Ireland are necessarily short. Of those which drain the external districts, the chief are the Blackwater and Lee in Cork, the Foyle in Donegal and Derry, the Bann and Lagan in Antrim and Down, and the Slaney in Wexford. The rivers of the central district have longer courses and a much greater body of water; some flow northward into the Boyne; some southward into the Barrow, Nore, and Suir; and some west into the Shannon. Those portions of the central plain which lie beyond the basins of the Shannon and Boyne discharge their chief drainage into a series of lakes which skirt the limits of the limestone country on the west and north. The other principal lakes of Ireland lie within the basin of the Shannon, those of most consequence being merely expansions of that river. The water-power afforded by the different rivers and natural dams of Ireland is greater than in any equal extent of accessible country in Europe. The surface of all the lakes in Ireland is estimated at 215,252 statute acres, or 336 square miles.

Climate.—There is but a small portion of Ireland which is more than 50 miles distant from the sea-coast, and on three sides of the island the Atlantic Ocean extends uninterrupted: hence the climate is more moist and less liable to severe cold than in any of the neighbouring countries. The prevalent winds are from the west and south, and these are usually accompanied by a mild state of the atmosphere. Easterly winds are keen, and much dreaded by invalids.

Produce, Manufactures, Trade, &c.—The inhabitants are much more numerous in the eastern than the western part of the island. The number of houses in 1841 was 1,384,360, being one house to about six persons. The Roman Catholics of Ireland are estimated at about $4\frac{1}{4}$ to 1 Protestant. In 1841 there were about 500,000 children attending schools; since that period the number has largely increased. The annual rental of the land was estimated in 1841 at 5,600,000*l.*

Of the 20 millions of acres of land in Ireland, it has been estimated that $5\frac{1}{4}$ are arable and garden ground; $6\frac{3}{4}$ meadows, pastures, and marshes; 5 improveable wastes; and the rest unimproveable wastes. In 1841 there were about 350,000 acres of plantations in Ireland. The total number of persons holding land was 883,097, giving an average of about 22 acres to each holder; and of this number no less than 124,487 holdings were less than one acre in extent. In 1847, exactly one-fourth of the whole area of Ireland was under crop, comprising about 5,000,000 acres; of which two-thirds were under corn-crops; and one-third under crops of beans, potatoes, turnips, clover, flax, &c. The corn-produce in that year was about 16,000,000 quarters; comprising wheat, oats, barley, bere, and rye; and giving about 5 quarters average per acre. In the same year there were 803,025 holdings, on which were enumerated the following live stock:—557,917 horses and mules, 126,355 asses, 2,591,415 cattle, 2,186,177 sheep, 622,459 pigs, 164,043 goats, and 5,691,055 head of poultry.

The fisheries of Ireland are carried on upon a considerable scale. They have been, by the Act 5 and 6 Vict. c. 106, placed under the management of the Board of Works. The whole coast of Ireland has been divided by the commissioners into 28 fishery districts, in which were registered, in 1845, 19,883 vessels and boats, and 93,073 fishermen and boys.

Among the manufactures of Ireland, that of linen takes the lead: it gives a flourishing character to the district around Belfast and Coleraine. Cotton spinning and weaving, and calico bleaching and printing, also occupy many hands. The woollen and silk manufactures, once carried on to a respectable extent, have greatly declined within the last few years. In grinding, malting, brewing, and distilling, a considerable trade is carried on. The malt made in Ireland in 1847 amounted to 178,369 quarters. The licensed brewers were 109; and the licensed victuallers 15,224. The quantity of spirits distilled in Ireland in the same year was 5,737,687 gallons. There are numerous paper-mills, glass-works, and tobacco manufactures.

The inland traffic is kept up by tolerably good roads, rivers, canals, and railways. The chief canals are the Grand Canal, Royal Canal, Shannon Navigation, Limerick Navigation, Lagan Navigation, Newry Navigation, Tyrone Navigation, Boyne Navigation, Slaney Navigation, Barrow Navigation, and Ulster Canal, giving about 620 miles of available navigation. The Railway Acts for Ireland are very numerous. Between 1831 and 1848, the railways sanctioned by Acts of Parliament presented a total length of 1660 miles; but the works are being prosecuted under great financial difficulties. The length of railway opened in Ireland in February 1849 was 237 miles.

The external traffic is greatly aided by steam power. Steam vessels of large size run from London, Plymouth, Bristol, Holyhead, Dublin, Fleetwood, Greenock, and Glasgow, to Cork, Waterford, Wexford, Dublin, Belfast, Londonderry, and other Irish ports. In 1847 the intercourse between Great Britain and Ireland gave employment to 8085 vessels, of 1,296,610 tons (entered inwards); and 17,935 vessels of 2,047,387 tons (entered outwards). The shipping of Ireland at the commencement of 1848 stood thus: sailing vessels 2215, of 241,789

tons; steam-vessels 104, of 23,767 tons. In 1847, 507 vessels entered Irish ports from the colonies, and 694 left Irish ports for the colonies.

The annual value of property in Ireland rated to the poor rate, in 1846, was 13,107,421*l.*; the poor rate amounted to 567,897*l.*; and the total number of persons relieved out of the poor-rate was 333,019.

Government, Divisions, &c.—Ireland is represented in the imperial parliament by 105 members of the House of Commons, and 28 temporal and 4 spiritual peers in the House of Lords. The temporal peers are elected representatives for life; the spiritual peers take the office in rotation.

Ireland is divided into four provinces and thirty-two counties. The counties are divided into baronies, and the baronies into townlands. The following is a list of the provinces, with the counties included in each; the population according to the census of 1841; and the area in square miles:—

	Population.	Area.
Connaught.		
Galway	440,198	2447
Leitrim	155,297	613
Mayo	388,887	2131
Roscommon	253,591	949
Sligo	180,886	721
Total	1,418,859	6861
Leinster.		
Carlow	86,228	346
Dublin	372,773	354
Kildare	114,488	654
Kilkenny	202.240	796
King's County	146,875	772
Longford	115,491	421
Louth	128,240	316
Meath	183,828	906
Queen's County	153,930	664
Westmeath	141,300	708
Wexford	202,033	901
Wicklow	126,143	781
Total	1,973,731	7619
Munster.		
Clare	286,394	1294
Cork	854,118	2884
Kerry	293,880	1853
Limerick	330,029	1065
Tipperary	435,553	1659
Waterford	196,187	721
Total	2,396,161	9476
Ulster.		
Antrim	360,875	1162
Armagh	232,393	513
Cavan	243,158	746
Donegal	296,448	1865
Down	361,446	967
Fermanagh	156,481	714
Londonderry	222,174	810
Monaghan	200,442	500
Tyrone	312,956	1260
Total	2,386,373	8555
Grand Total	8,175,124	32,511

Each of the 32 counties returns 2 members to the House of Commons, and the University or Dublin 2 members. The cities and boroughs return 39 members to the House of Commons.

Ireland, previous to the passing of the act 3 & 4 Will. IV., c. 37, was divided into 4 ecclesiastical provinces and 32 dioceses. Under that act there are now 2 archbishoprics—Armagh and Dublin; and 11 bishoprics—Meath; Clogher; Kilmore, Ardagh, and Elphin; Derry and Raphoe; Limerick, Ardfert, and Aghadoe; Killaloe, Kilfenora, Clonfert, and Kilmacduagh; Tuam, Killaloe, and Achonry; Ossory, Ferns, and Leighlin; Cashel, Emly, Waterford, and Lismore; Cork, Cloyne, and Ross; Down, Connor, and Dromore. The dioceses are divided into parishes, which are for the most part coextensive with a certain aggregate of townlands. There are 2348 parishes.

The Roman Catholic establishment consists of 4 archbishops and 23 bishops.

The Presbyterian body are divided into 2 sects; one in connection with the synod of Ulster, which agrees in doctrine and government with the church of Scotland; and the other with the synod of Munster and Remonstrant synod. The Seceding body have also their synod.

The law courts of Ireland are the Queen's Bench, Common Pleas, Exchequer, and Chancery. There is also, as in England, a bankrupt court, a court for the relief of insolvent debtors, a court of admiralty, with consistorial courts in the several dioceses, and a metropolitan ecclesiastical court. There are four judges in each of the courts of Queen's Bench, Common Pleas, and Exchequer. In the Court of Chancery there are the lord-chancellor and the master of the rolls.

The administration of the government is vested in the lord-lieutenant and privy-council, assisted by a chief secretary and an-attorney and solicitor-general. The lords-lieutenant and magistrates of the several counties are appointed by the crown and lord-chancellor, and the sheriffs are generally nominated by the going judges and appointed by the lord-lieutenant.

History and Antiquities.—All the early names of Ireland, such as *Iris*, *Erin*, *Hibernia*, are believed to be derived from the same Celtic roots. The *Scoti*, who were in possession of the island at the time of the introduction of Christianity, appear to have been to a great extent the successors of a people whose name and monuments indicate a close affinity with the Belgæ of Southern Britain. The monuments and relics which attest the presence of a people considerably advanced in civilisation at some period in Ireland, such as cyclopean buildings, sepulchral mounds containing stone chambers, mines, bronze instruments and weapons of classic form and elegant workmanship, would appear to be referrable to some of the predecessors of the Scoti.

The general conversion of the Irish Scots to Christianity took place in the earlier and middle portion of the fifth century. The principal instrument in effecting the change was Patrick, who landed in Ireland on this mission in the year 432. A considerable advance in civilisation

followed the introduction of the new religion. Greek and Roman literature got some footing among the clergy, and an improved system of architecture became requisite for religious edifices. The Irish round towers are now generally ascribed to an ecclesiastical origin, and are supposed to have been erected during the sixth, seventh, and eighth centuries. The country was torn by civil contests, from the eighth to the twelfth centuries, between the kings and chiefs. In 1174 Henry II. of England took possession of the island with the formal sanction of the Pope, and made the native kings and chiefs his tributaries. The country was portioned out among the Anglo-Norman conquerors. In the 12th year of the reign of King John, the division into counties took place, and appears to have embraced almost the whole of Ireland, though through subsequent reverses most of the counties in Ulster and Connaught ceased to be considered shire-ground. English laws and customs were to some extent introduced; but the great barons, finding the Irish laws more congenial to arbitrary authority, gradually assumed the character of despotic chieftains; so that, on the accession of King Henry VIII., there was only an inconsiderable tract along the eastern coast in which the English law was fully recognised.

In this and the succeeding reigns of Elizabeth and James I., the English government having now the double motive of effecting a religious as well as a civil reformation in Ireland, applied themselves with great energy to the recovery of their authority, and, after a tedious series of rebellions and confiscations, succeeded at length, in the beginning of the seventeenth century, in making the entire island shire ground, and planting a numerous Protestant proprietary in Ulster. Rebellions broke out in 1641 and 1689, for restoring the older order of things. Extensive confiscations followed; and a system of much severity was adopted towards the political leaders; yet, notwithstanding the harshness of the penal laws from time to time enacted against Roman Catholics, the country generally prospered during the century of uninterrupted tranquillity that ensued. Another outbreak occurred in 1798; but this, being likewise suppressed, led the way to the Act of Union, by which the parliament of Ireland, which had of late years enjoyed an absolute independence of all power but the crown, was merged in that of the United Kingdom, A.D. 1800.

In 1829 the Roman Catholics, who had greatly increased in Ireland, were emancipated from many of the penal laws which pressed upon them. In 1832 the Irish Reform Bill passed. About the same year, the agitation for a repeal of the legislative union with Ireland commenced, and has been continued almost yearly to 1849; and, on the other hand, government measures for the suppression of disturbances have been often put in force. In 1833 and 1836 acts were passed by which several of the bishoprics were incorporated with others, and regulations were made for the improved application of the revenues of the church. In 1838 a Poor Law for Ireland was first enacted, which has been altered, amended, and extended to the establishment of fever-hospitals and other charities by subsequent acts. In consequence of the distress prevalent in Ireland, these laws have been subjected to a severe trial; and, owing to the extreme poverty of the southern and western parts of the country, a rate in aid, imposed on the whole of Ireland, has been proposed to the British parliament, and is now (March 1849) under discussion. In 1838 also an act was passed for commuting Irish tithes into rent charges. In 1840 a law was put into operation in Ireland, similar to the Municipal Reform Act of England; and in the same year the Repeal movement and the Temperance movement both presented very striking features. In 1841 an Irish Agricultural Society was founded, having for its object the development of husbandry in that country. In the summer of 1842 food-riots in many parts of Ireland bore witness to the impoverished state of the peasantry. Political agitation reached a great height in Ireland in 1843. The measures advocated were —the total abolition of the tithe rent-charge; fixity of tenure for occupying tenants; encouraging Irish manufactures; universal suffrage and vote by ballot; and abandonment of the new poor law. Two great repeal meetings were held at the hill of Tara, the traditionary abode of Irish royalty, in August; and at Mullaghmast in October; but another meeting at Clontarf was prevented by the government, and Mr. O'Connell and several other persons were tried for sedition. These trials, and the appeals, and 'writs of error,' consequent thereon, occupied public attention during a great part of 1844. In the same year another step was made towards the removal of penal statutes against the Roman Catholics of Ireland. In 1845 two important acts were passed: one for placing on an improved footing the Roman Catholic College of Maynooth; and the other for enabling the crown to endow new colleges in Ireland. The buildings for Maynooth, and for the colleges at Cork, Galway, and Belfast, are now in progress, and professors have been appointed for the last three. The potato crop of this year was almost wholly diseased: a circumstance which led immediately to the adoption of large plans for relief, and indirectly to the repeal of the corn laws. The year 1846 exhibited the effects of this failure of the potato-crop in starvation and insurrection. The spring of 1847 brought with it the full horrors resulting from the famine: many thousands perished from actual starvation, and thousands more from fever, notwithstanding the unprecedented aid derived from England and elsewhere. In August nearly 3,000,000 rations of food were daily distributed to the suffering Irish by the Relief Commissioners. By the month of October, outrages and murders became very frequent; and the government had to adopt stringent measures for their prevention. In 1848 the revolutionary party attained great influence by the month of March, and carried on those proceedings which led to the conviction and transportation of Mr. Mitchell in May; the club meetings were suppressed in Dublin, but subordinate clubs and armed bands were organised in the provinces. In

July matters were brought to an issue by the total failure of a rebellious rising near Ballingarry; and the legal prosecutions arising out of these disturbances lasted at intervals from August 1848 to March 1849.

IRELAND ISLAND. [BERMUDAS.]

IRELAND, NEW. [NEW IRELAND.]

IRENÆUS, SAINT, bishop of Lyon in Gaul, was a pupil of Polycarp, in Asia Minor, and a presbyter of Pothinus, bishop of Lyon. After the martyrdom of Pothinus, in A.D. 177, Irenæus was elected Bishop of Lyon. He discharged the duties of his office with diligence, and is said to have been the means of converting many pagans to the Christian religion. The place of his birth is not known; but it is probable that he was a native of Asia Minor. It is commonly supposed that he suffered martyrdom in the beginning of the third century; but even that is uncertain.

With respect to the works of Irenæus, we learn from Eusebius ('Hist. Eccl.,' v. 20.) that he wrote several letters against those which at Rome corrupted the true doctrine of the church; one to Blastus, concerning schism; another to Florinus, concerning the monarchy, or that God is not the author of evil; and concerning the number eight, and also a discourse against the Gentiles, entitled Concerning Knowledge; another inscribed to a brother named Marcianus, being a demonstration of the apostolical preaching; and a little book of divers disputations. Irenæus also wrote a letter to Victor, bishop of Rome, concerning the controversy about the time of holding Easter; and also 'Five Books against Heresies.' A Latin translation of the last work is still extant; but all the rest have perished, with the exception of a few fragments.

The life of Irenæus has been written by Gervaise, Paris, 1723. His works have been published by Erasmus, 1526; by Feuardent, 1596; by Grabe, 1710; and by Pfaff, 1734. Some of the fragments, published for the first time by Pfaff, are supposed by Lardner to be spurious.

IRETON, HENRY, the eldest son of German Ireton, of Attenton, in Nottinghamshire, was born in 1610. He was entered at Trinity College, Oxford, in 1626, and, having taken the degree of bachelor of arts, became a student of the Middle Temple. He entered the parliamentary army, and made such a proficiency in the military art, that it has been asserted that Oliver Cromwell learned its rudiments from him. In 1646 he married Bridget, Cromwell's eldest daughter. He distinguished himself in the battle of Naseby, and was taken prisoner by the royalists, but made his escape. He attended most of the sittings of the regicide court, and signed the warrant for Charles's execution. On the establishment of the Commonwealth he was made president of Munster, and afterwards lord-deputy of Ireland. While in the height of his successes he was seized, before Limerick, with the plague, of which he died on the 15th of November, 1651. He was buried in Henry the Seventh's chapel in Westminster Abbey; but the corpse was exhumed after the Restoration, gibbeted, and burnt at Tyburn.

IRIARTE, [YRIARTE.]

IRIDA'CEÆ, a natural order of endogenous plants. The genera are numerous, and some not well defined; they inhabit the temperate parts of the world in preference to the hottest, where they are comparatively rare. The *Iris* and *Crocus* are representatives of the predominant northern form of the order, as *Gladiolus* and *Ixia* are of the genera prevalent in the southern hemisphere. All the species are sufficiently ornamental to deserve cultivation, and many are of striking beauty.

IRI'DIUM, a metal found combined with platinum in the ores of the latter metal, from which it may be separated by a complex chemical process. A few minute grains of native iridium have been met with.

Iridium is brittle, and when carefully polished has the appearance of platinum. When heated to redness in the air, if in a state of fine division (which is obtained by precipitation), it is oxidised, but not if in mass. Iridium is with difficulty acted upon by acids.

Oxygen and Iridium combine and form several oxides: the protoxide, sesquioxide, and teroxide. They are precipitated by the alkalis from the corresponding chlorides. The protoxide is black, and greenish gray when combined with water. The sesquioxide is also black, but its hydrate is deep brown. It is not decomposed by a low red heat. When slightly heated with charcoal, sulphur, or phosphorus, it detonates violently. Acids do not act upon it, but, on the contrary, it unites with salifiable bases. The teroxide is yellowish brown, or greenish in the state of hydrate.

Chlorine and Iridium.—The protochloride of iridium is insoluble in water, and is sparingly dissolved by acids or nascent chlorine. The sesquichloride has so dark a yellowish brown tint, that a small quantity renders water opaque. It yields by evaporation a dark-coloured, uncrystallisable, deliquescent mass. The bichloride has many of the external properties of the last-named compound.

Iridium combines with carbon when a piece of this metal is held in the flame of a spirit lamp. The resulting compound consists of about 19.8 of carbon, and 80.2 of iridium. The remaining compounds of iridium are very little known.

IRIS. [EYE; RAINBOW.]

IRIS, a genus of plants the type of the natural order *Iridaceæ*. *I. versicolor*, Blue Flag, is a native of swamps and wet meadows in the United States. The root-stock has a nauseous acrid taste. It acts as a cathartic. *I. pseudacorus*, Yellow Flag, is a native of wet places in Great Britain, France, Germany, and most countries in Europe. *I. Florentina*, Florentine Iris, is a native of the southern parts of Europe and the islands of the Mediterranean. The root-stock, known by the name of *Orris-Root*, has an aromatic odour and subacrid taste, and is employed as a dentifrice. It was at one time used in medicine, and admitted into the British Pharmacopœias. The fresh root-stock acts as a purgative, and was also employed as an expectorant in diseases of the chest. When dried and turned into small balls, it is used for Issue-Peas. Many species of Iris have been

described. *I. Germanica* has been used for the same purposes as *I. Florentina*, and they are considered by some botanists as identical. The roots of many of them contain starch, and Pallas says that the roots of *I. dichotoma* are eaten in Siberia. *I. edulis* is eaten by the Hottentots of Africa. All these species are cultivated in gardens on account of their handsome showy flowers.

IRI'TIS is an inflammation of the iris, the membrane that surrounds the pupil of the eye. It most frequently originates in a disordered state of the system, as in gout or syphilis, but it sometimes follows the exposure of the eye to an intense light, or is produced by external injury, as the wound which is made in the operation for cataract, &c. This disease requires an active antiphlogistic treatment.

IRKUTSK. [SIBERIA.]

IRON. Of all the metals iron is the most widely diffused, the most abundant, and the most useful. It is found not only intermixed with soils, and contained in rocks and minerals, but it is even met with in some animal and vegetable bodies, and also in mineral waters.

Iron occurs rarely in nature in the metallic state, for almost the whole of it that has been found occurs as meteoric iron containing nickel, or in meteoric stones. It is mostly found either combined with oxygen, oxygen and carbonic acid, or sulphur; the last-mentioned is not however worked as an ore. The best iron ores are oxides, which occur in primitive countries, where they generally form very large beds; such are those of Sweden: but the greater part of the iron ore of Britain is an impure carbonate.

The colour of iron is grayish white with a tint of blue. It is extremely ductile, so that it may be drawn into wire finer than the human hair, but it cannot be beaten into very thin leaves. It is of all metals the most tenacious, for a wire 0.787 of a line in diameter is capable of supporting a weight of about 550 lbs.

Iron is susceptible of a high polish. It is combustible when minutely divided, as in the state of filings. It is very hard at common temperatures, and this property may be increased by its being heated and then suddenly cooled; it then however becomes brittle. It requires a most intense heat to melt it, but when heated to redness it becomes soft and pliable, and possesses the valuable property of *welding*, that is, two pieces of red-hot iron may be made to unite by hammering. Its texture is fibrous. Its specific gravity is about 7.77; but this varies in some degree according to the extent to which it has been drawn, rolled, or hammered, and it is increased by fusion. Iron, or rather steel, is capable of being rendered permanently magnetic. Iron has great affinity for oxygen and sulphur, and some other elementary bodies, and combines with them in various proportions.

Meteoric Iron.—There have been found in different parts of the earth large masses of native or metallic iron, of the history and origin of which nothing very accurate is known; but they are regarded as being of meteoric origin. The largest specimen yet met with was found in Peru: it weighed 15 tons. Some specimens occur in a crystalline state.

Ores of Iron.—The chief of these may be noticed:—

Oxydulous or *Magnetic Iron*, formed by a combination of the protoxide with the sesquioxide of the metal, is found crystalline, massive, and arenaceous. The crystals occur attached and imbedded. The primary form is a cube, but it is generally met with in the form of the regular octahedron. The massive varieties have a granular texture. Native loadstones consist of this ore, and the best Swedish iron is made from it.

Oligiste Iron; Specular or *Micaceous Iron.*—This occurs crystallised and massive. The crystals are attached; the primary form is a rhomboid; lustre metallic; colour steel and iron gray; the surface frequently iridescent; obeys the magnet slightly.

Goethite, Pyrosiderite.—Occurs in very thin transparent crystalline plates in the cavities of black hematite. Colour brownish red, by reflection yellowish, in a strong light of a brilliant red; lustre adamantine.

Iron Froth consists of very thin brownish red scaly particles, which have a greasy feel, and stain the fingers. The massive varieties are amorphous; structure foliated.

Red Hematite occurs in globular and botryoidal masses. Lustre externally sometimes metallic, sometimes dull; internally nearly dull. Colour externally red; grayish red, &c., internally.

Brown Hematite; Hydrous Oxide of Iron; Brown Iron Ore.—Occurs in attached crystals and massive prisms. Primary form a right rhombic prism; colour brownish. The massive varieties are globular, reniform; some of the varieties constitute brown clay iron-stone.

Carbonate of Iron; Brown Spar; Spathose Iron Ore.—This occurs in attached crystals and massive. Primary form a rhomboid; very variously coloured. The massive varieties have a fibrous structure, and become magnetic before the blowpipe.

Clay Iron-Stone, or *Argillaceous Iron Ore*, consists essentially of carbonate of iron mixed with various proportions of earthy matter; on an average carbonate of iron forms about one-third of the abundant clay iron-stone of England, Wales, and Scotland. It occurs in beds and in coal deposits; it is found sometimes in globular masses, and also columnar.

Although various other minerals occur containing large quantities of iron, yet the above-described contain almost all the ores which are extensively used in the manufacture of iron. Among the other varieties are *Carburet of Iron*, or *Graphite*, and *Iron Pyrites*, of many different forms.

We now proceed to consider the artificial oxides and other compounds of iron which are procured by chemical agency.

Oxygen and Iron combine to form three or four bodies. The *protoxide* ($O^1\ I^1$) is black, tasteless, insoluble in water, readily dissolved by most acids, and obeys the magnet. The *magnetic oxide* ($O^4\ I^3$) is black, obeys the magnet, brittle, easily reduced to powder, insoluble in water. The

peroxide or *sesquioxide* ($O^3\ I^2$) constitutes the common rust of iron; it has a red colour; it is inodorous, insipid, insoluble in water, and forms red solutions with acids.

Chlorine and Iron combine to form two chlorides. The *protochloride* ($Ch^1\ I^1$) is a gray crystalline substance; it is very soluble in water, but insoluble in absolute alcohol. The *perchloride* ($Ch^3\ I^2$) appears as brownish iridescent scales, very deliquescent. The aqueous solution is readily decomposable.

No permanent compounds of *Nitrogen* or *Hydrogen* with iron are known.

Fluorine and Iron.—The *protofluoride* ($F^1\ I^1$) appears in small colourless square crystals, sparingly soluble in water. The *perfluoride* ($F^3\ I^2$) is a pale flesh-coloured substance, astringent, and slightly soluble.

Bromine and Iron unite to form a yellow fusible *bromide* ($B^1\ I^1$), readily soluble. There is also a *perbromide*.

Carbon and Iron combine, and the resulting compound is steel, or perhaps it may be stated that steel contains carburet of iron. [STEEL.] There are also many substances, such as plumbago, or black-lead, which consist principally of carbon and iron.

Sulphur and Iron readily unite, and the native compounds are among the ores before described. *Protosulphuret* of iron ($S^1\ I^1$), having much the appearance of the native mineral, may be formed by two or three different processes: one of which yields a hard brittle bronze-coloured substance, and the other a dark pulverulent body. The *bisulphuret* ($S^2\ I^1$) appears as a yellow crystal or a yellow powder, according to its mode of preparation. There are probably other sulphurets of iron.

Phosphorus and Iron.—*Diphosphuret* of iron ($P^1\ I^2$) is a fused granular mass, having the colour and lustre of iron, is very brittle, and not acted upon by hydrochloric acid. It is said that what is called cold-short iron owes its brittle property to the presence of this compound. The *perphosphuret* ($P^4\ I^3$) bears some resemblance to it.

Iodine and Iron unite to form a *protiodide* ($Iod^1\ I^1$), an iron-gray coloured opaque mass, which is very deliquescent, and soluble both in water and in alcohol. It is used in medicine. The *periodide* ($Iod^3\ I^2$) is a red, volatile, deliquescent compound.

Boron and Iron form a *boruret*, a silver-white and brilliant substance, produced with great difficulty.

Selenium and Iron form a *seleniuret* ($S^1\ I^1$), which has a grayish colour with a tint of yellow; it is hard and brittle.

The *Alloys of Iron* are much less useful than might be expected from the extreme utility of the metal itself.

Potassium and iron, and *sodium* and iron, combine when heat is applied to them: the alloys are more fusible than pure iron, especially when in contact with the air. These alloys are decomposed by air and water. *Silicium* and iron form an alloy which is ductile or brittle according to the quantity of charcoal which it contains. *Arsenic* and iron form an alloy which has a grayish white colour, does not obey the magnet, is very brittle, and much more fusible than iron. Other alloys with arsenic may be formed. *Chromium* and iron form an alloy very little known. With *columbium* a hard brown alloy is formed. *Zinc* gives a white and brittle alloy with iron. *Tin* and iron form the alloy seen on tin-plate ware. *Antimony* and iron unite when heated together in close vessels: the alloy is white, hard, brittle, and its specific gravity is less than that of the mean of the two metals. No metal appears to deprive iron more of its magnetic property than antimony. *Cobalt* and iron form a hard magnetic alloy. *Nickel* and iron form the meteoric alloy. *Bismuth* combines with difficulty with iron. *Molybdenum* forms with it a blueish gray brittle alloy. The alloy of *copper* and iron is magnetic. *Silver* combines readily with iron when they are fused together, but they separate on solidification, and globules of silver appear on the surface of the alloy. With *Mercury* a white tenacious alloy is formed. *Lead* and iron combine with difficulty. *Rhodium, iridium, tungsten,* and *platinum* may all be made to form alloys with iron. *Gold* and iron combine with facility. A compound of eleven parts of gold and one part of iron is nearly white. It is very ductile, and its specific gravity 16.885. An alloy of three parts of iron and one part of gold is of a silver colour, and is attracted by the magnet.

The action of acids upon iron is different, being greatly dependent upon their nature and composition, and upon their temperature at the time of contact.

Sulphate of Iron, or *Sulphate of Protoxide of Iron*, is largely prepared for various purposes, especially for dyeing black. It is generally known as *copperas*, or *green vitriol*. The primary form of the crystal is an oblique rhombic prism; its colour is blueish green when recently prepared, but by exposure to the air, and the partial peroxidisement of the iron, it becomes first green and eventually yellowish. Like the other salts of iron, it has a disagreeable styptic taste. The *sulphate* of *peroxide* of iron may be considered as representing the soluble salts of peroxide of this metal. It is of a reddish colour when concentrated, and yellowish when diluted. No crystals are obtained by evaporation, but there remains a brown deliquescent mass; its taste is very astringent, and it is soluble in alcohol.

Nitrates of Iron.—Of these, as of the sulphates, there are two. When iron is acted upon by very dilute nitric acid, a *protonitrate* of a pale green colour is obtained; but when the acid is moderately diluted *pernitrate* of iron is formed: this resembles the persulphate in its more important properties.

Carbonate of Iron.—It is only the protoxide of iron which combines with carbonic acid to form a solid compound. Carbonate of iron exists in nature, and is the basis of what is termed the *argillaceous iron ore*; it sometimes also occurs pure in transparent rhombic crystals.

Phosphates of Iron.—The *protophosphate* occurs in Cornwall, America, &c., as a greenish oblique rhombic prismatic crystal; it may also be prepared artificially as a blue precipitate. The *perphosphate* is white; it is obtained by adding phosphate of

soda to persulphate of iron. Like the proto-phosphate, it is insoluble in water, but dissolved by acids, and may be precipitated from them unaltered.

Arseniates of Iron.—The *proto-arseniate* is a grayish precipitate, which by exposure to the air absorbs oxygen and becomes darker. The *perarseniate* is a yellowish white insoluble powder.

Chromate of Iron. [CHROMIUM.]

IRON MANUFACTURE AND TRADE.—The art of smelting iron was practised in this country during the time of the Roman occupation, and in many ancient beds of cinders, the refuse of iron-works, Roman coins have been found. The principal ancient seats of the iron manufacture in this country appear to have been Sussex and the Forest of Dean, or Arden, as it was then called. Remains of ancient iron-furnaces have been noticed in Lancashire, Staffordshire, and Yorkshire. The art of working in iron and steel was much practised in this island before the Norman conquest.

There are two distinct qualities into which this metal is commonly divided, viz. *pig-iron* and *malleable* or *bar iron*, the second being the result of an extension of the processes necessary for the production of the first kind.

The first process is that of reducing the iron-stone or ore, or, as it is technically called, the *mine*, into a metallic state by means of fusion. This operation is conducted in a *blast-furnace* or *smelting-furnace*. [FURNACE.] The furnace is charged from the top with certain proportions of iron-ore, coke, and limestone. The ore is previously roasted in a kiln, in order to drive off the water, sulphur, and arsenic, with which it is more or less combined in its native state: by this process it loses one-sixth part of its weight. A furnace of the size commonly used in Wales will produce from 5 to 6 tons of pig-iron in twelve hours. For the largest quantity the furnace must be charged progressively with 15 tons of roasted iron-ore, 22½ tons of coke, and about 6 tons of limestone. These ingredients are supplied at 50 charges, and must be intimately mixed together in the furnace. The limestone must be broken into small pieces; its use is to act as a flux to the ore and promote its fusion. The heat that would be produced in any furnace by merely setting fire to the fuel which is contained in it would be altogether insufficient for the fusion of the ore, if its intenseness were not promoted by the forcing in of a current or blast of air. For this purpose it is necessary to use a strong mechanical force, and of late years the agency of steam has been most commonly employed for this purpose. The blast is carried into an intermediate chamber of a spherical or cylindrical shape, called a regulator; and, as the air is in a state of condensation when admitted, its effort to expand itself again to its natural volume causes the continuous and regular supply to the furnace which is necessary. The air thus forced into the furnace keeps the heat at a degree of intenseness which is indispensable for the smelting of the ore. A most important improvement was made by Mr. Neilson, some years ago, in using the the *hot-blast* instead of the *cold*, that is, drying and highly heating the air before it is forced into the furnace. This has proved to be the most valuable and economical of all modern inventions in the iron manufacture.

The iron is run from the furnace every twelve hours, by tapping it in the front on a level with the bottom of the hearth. When the furnace is tapped, the metal is allowed to run into channels formed in the sand of the smelting-house floor. The names of *sow-metal* and *pig-metal*, which were originally given by the workmen, signify in one case the blocks of iron which are formed in the large main channels, and in the other case the smaller blocks which are formed in smaller side channels communicating with the larger ones.

The quality of pig-iron varies according to the purposes for which it is intended, and depends not only upon the quality of the ore, but also upon that of the fuel. The principal division is into *foundry-iron* and *forge-iron*, the former being used for castings, the latter for conversion into malleable iron. Foundry-iron is further divided into three qualities, distinguished by the numbers 1, 2, and 3, and differing in the amount of carbon combined, the fluidity when melted, and the hardness when cooled. Forge-iron is divided also into three qualities, and is distinguished as *bright iron*, *mottled iron*, and *white iron*, which names are indicative of the appearance which each quality presents to the eye; they have less carbon, less fluidity, and more hardness, than foundry-iron.

Forge or bar iron is pig-iron freed from carbon and oxygen. The first operation for producing this change is called *refining*, and is performed in small low furnaces about three feet square at the base, having the bottom, or hearth, of fire-bricks, and the sides of cast iron, made hollow to allow a stream of water to pass constantly through, which prevents their being quickly burnt away; near the top are holes for the insertion of blast-pipes. The iron is kept in a state of fusion in the refinery for some time exposed to an intense heat produced by a strong blast, and is then run out into a flat mould twenty feet long by two wide, placed over a cistern of water, where it speedily cools into a bright brittle state.

The first process employed for making bars is called *puddling*, and is performed in a *reverberatory furnace*, thence called a *puddling-furnace*. [FURNACE.] The quantity of refined metal put into this puddling-furnace at each charge is from 3½ to 4 cwt. In about half an hour from the charging of the furnace the metal begins to melt. The puddler then observes, through a small hole provided for that purpose and for the introduction of his tools, the progress of the work. The business of the puddler is so to dispose of the pieces of metal, moving them by means of his tools, as to insure an equable application of heat to the mass. When the whole quantity is fully melted, the puddler stirs the metal about briskly, changing his tools continually, that they may not be melted. By means of this agitation the metal gives off an elastic fluid, and after a time becomes thick, and grows increasingly so, until it loses all fluidity and forms into lumps. The contents of the furnace are then divided into five or six portions by the puddler, and each is made up by

means of his tools into a spherical form. These balls are technically called *blooms*. Being taken from the puddling-furnace, they are subjected each to 10 or 20 blows from a heavy hammer (called shingling), which makes them more compact and gives them a shape more convenient for going through the rollers. These rollers consist of two cylinders working in contact, and having on their surfaces a series of groves, varying in size. The iron is passed through all these groves in succession, until it is reduced to the requisite width and thickness. It is thus converted from a fusible, hard, and brittle substance, to a tough and elastic bar which is hardly fusible, and which, from its property of yielding and altering its form under the hammer, has acquired the name of malleable iron.

The bars, when they have been passed through these rollers, and while yet hot, are cut into convenient lengths and taken to the balling-furnace, the shape and construction of which resemble those of the puddling-furnace. In this balling-furnace the bars are piled evenly, so that one bar does not project beyond another. Several of these piles, each of which is composed of five or six bars, are placed at once in the furnace, and when sufficiently heated, so that they will weld together, the piles are taken out separately, and are passed again through rollers similar in construction to those described above, but differing from each other in the form of their orifices and grooves, so that either round or flat or square rods and bars may be produced at the pleasure of the maker, and these, when weighed and put up into bundles, are ready for sale.

The manufacture and trade in iron in this country have now become very extensive. The produce in Great Britain in 1740 was estimated at 17,350 tons; in 1806, 258,000 tons; in 1828, 700,000; in 1840, 1,400,000. Of this last quantity, it was estimated that 530,000 tons were made in Wales, 250,000 in Scotland, and the rest in England. Either the estimate for Scotland is much too low, or the iron manufacture of that country must have increased enormously in the next few years; for there were no less than 600,000 tons of pig-iron alone sold at Glasgow in 1846. In that year there were 141 iron furnaces in Scotland. In the various processes from the smelting to the casting and rolling, the weight of coal used is about five times that of the iron; so that a produce of 1,600,000 tons of iron would absorb the enormous quantity of 8,000,000 tons of coal.

The exports of iron, hardware, and cutlery, are very large. In 1846 they were—

Hardware and cutlery . .	392,314 cwts.
Iron and steel, wrought and unwrought	433,325 tons.

The declared value of these exports was above 6,000,000*l*.

IRON, *Medicinal Properties of*. [Chalybeate Springs.]

IRONY (*εἰρωνεία*), a refined species of ridicule, which under the guise of earnestness and simplicity exposes all undue pretensions, even while it professes to honour and admit them. Of English writers Swift contains the strongest and the most numerous examples of irony.

IROQUOIS. [North American Indians.]

IRRADIATION denotes, properly, the emission of rays from a luminous object, but the word is generally used to signify an apparent enlargement of the disc of a celestial body, this enlargement being caused either by a deviation of the rays of light from a rectilinear direction, or in consequence of the agitation produced on the retina within small distances about the points at which the rays in the pencils are made to converge by the humours of the eye; or, again, by the blending together of the circles of light produced by the pencils when these do not converge exactly on the retina.

It is a consequence of irradiation that objects which are in reality of equal magnitudes appear frequently to differ in size according to their colour or to the quantity of light which falls upon them. Sir William Herschel remarked ('Phil. Trans.,' 1783) that, when a bright circle was viewed together with a dark one on a bright ground, the latter always appeared smaller than the other.

IRRATIONAL QUANTITY. There are such things as magnitudes which are not in the proportion of any one number to any other; though if we may use numbers as great as we please, we can find a pair which shall be as nearly as we please in the ratio of any two such quantities.

According to the modern use of the term irrational, it simply means not expressible by a finite fraction. The word *ratio*, or its equivalent *λόγος*, does not here mean reason, in the common sense of the word, but mathematical proportion. A quantity whose proportion to the unit of quantity cannot be expressed arithmetically, that is, by a whole number, or a fraction, is 'inexpressible by an arithmetical ratio,' or 'arithmetically irrational,' abbreviated into 'irrational.' This explanation is very important, since the student might otherwise be led to suppose that irrational meant unreasonable or absurd. Suppose for example that we have a geometrical problem which we solve by the application of arithmetic, taking a certain line to be unity. Suppose the problem thus reducible to the solution of $x^2=2$, or the quantity sought is such a fraction as multiplied by itself will give 2. The arithmetical answer is very simple; there is no such fraction. But is the problem therefore impossible? By no means; for the line required must be the diagonal of a square whose side is the linear unit. What, then, is the reason for our not being able to produce an arithmetical solution? Because the ratio of the line sought to the linear unit given is not to be expressed arithmetically, or is in the preceding sense irrational. The student has now arrived at the point where he must be taught (if he have not learnt it before) that arithmetic is not the science of all ratios or relative magnitudes, but only of the ratios of relative magnitudes of those quantities which are made by putting together quantities which are all equal to one another. The sense

alone would never make this distinction, and those who desire nothing more than sensible evidence in their mathematical studies need not attend to it: unfortunately the present bent of such pursuits tends to inexactness, not explicitly avowed, but wearing the appearance of absolute rigour.

The student who begins to extract the square root of numbers is allowed to place the symbol of that process over numbers which do not admit of its performance, as $\surd 2$, $\surd 3$, &c. These symbols are reasoned on as if they represented fractions, and arithmetical deductions are drawn; but, when it is required to reduce them to practice, then the possibility of determining their arithmetical values is denied, and it is implied that they have an existence which can only be approximately represented. Thus, since 1.4142 multiplied by itself gives 2 very nearly, it is said that 1.4142 is very nearly the square root of 2. This method, which is indispensably necessary in practice, should not be allowed in perfectly strict reasoning. It cannot be just to say that 2 has no square root, but that, since fractions very near to 2 have square roots, therefore these square roots are very near to the non-existent square root of 2. It is only in a properly extended arithmetic, which by express agreement admits of extended symbols of ratio, that it can be lawful to speak of the square root of 2.

IRRIGATION. Of all the substances which concur in the vegetation and growth of plants, water is the most essential. The warmer the climate, and the more rapid the evaporation, the more luxuriant is the vegetation, provided there be an abundant supply of water. This circumstance has suggested the plan of diverting streams and conducting them in channels to fertilise as great an extent of land as possible.

In China and in India, as well as in Egypt, ingenious modes of watering lands have been adopted from the most remote ages. No expense has been thought too great to secure a supply of water, and to distribute it in the most advantageous manner.

The whole art of irrigation may be deduced from two simple rules: first, to give a sufficient supply of water during all the time the plants are growing; and, secondly, never to allow it to accumulate so long as to stagnate.

The supply of water must come from natural lakes and rivers, or from artificial wells and ponds, in which it is collected in sufficient quantity to disperse it over a certain surface. As the water must flow over the land, or in channels through it, the supply must be above the level of the land to be irrigated. But there must also be a ready exit for the water, and therefore the land must not be so low as the natural level of the common receptacle of the waters, whether it be a lake or the sea, to which they run.

Along the banks of running streams nature points out the declivity. A channel, which receives the water at a point higher than that to which the river flows, may be dug with a much smaller declivity than that of the bed of the river, and made to carry the water much higher than the natural banks. It may thence be distributed so as to descend slowly, and water a considerable extent of ground in its way to rejoin the stream. This is by far the most common mode of irrigation, and the shape, size, and direction of the channels are regulated by the nature of the surface and other circumstances, which vary in almost every situation.

When there is a considerable fall and a sufficient supply of water, a series of channels may be made, so situated below each other, that the second collects the water which the first has supplied, and in its turn becomes a feeder to irrigate the lower parts of the declivity: a third channel receives the water and distributes it lower down, until the last pours it into the river. This is called *catch-work*, because the water is caught from one channel to another. This method is only applicable where there is a considerable fall of water and a gentle declivity towards the river. A small rill, which is often quite dry in summer, may still by judicious management be made to improve a considerable portion of land: its waters may be collected and allowed to accumulate in a pond or reservoir, and let out occasionally, so that none be lost or run to waste. If there is but a small quantity, it must be husbanded and made to flow over as great a surface as possible. If there is not a want of water, there may be a want of declivity to enable it to flow off, which, it should always be remembered, is an essential part of irrigation. Art may in this case assist nature by forming a passage for the water, either in its course towards the land to be irrigated, or from it after it has effected its purpose.

When the surface to be irrigated is very flat and nearly level, it is necessary to form artificial slopes for the water to run over. The whole of the ground is laid in broad beds, undulating like the waves of the sea; and the water, carried along the ridge of each bed, is allowed to flow down the slopes.

Experience has shown that there are particular seasons when the water has the best effect. During frost the water-meadows, having a current of water continually flowing over them, are protected from the effect of frost, and the grass will continue to grow as long as the water flows over it. Too much moisture, however, would be injurious, and the meadows are therefore laid dry by shutting the flood-gates whenever the temperature of the air is above freezing. By this management the grass grows rapidly at the first sign of spring. Before the dry upland meadows have recovered the effects of frost and begun to vegetate, the herbage of the water-meadows is already luxuriant; and by judicious management three or four crops of grass are obtained in each season, or only one abundant crop is made into hay, and the sheep and cattle feed off the others.

In hot weather much mischief may be done by injudicious flooding. In winter, on the contrary, the land may be covered with water for weeks without injury; and, if an earthy deposit takes place, the subsequent fertility is greatly increased. But this is not properly irrigation: it is inundation, and the effects depend on entirely different

causes. On the other hand water may be carried in small channels through meadows without being allowed to overflow: this is watering, but not properly irrigating. The great advantage of water-meadows in England is not so much the increased quantity of grass or hay which is obtained when they are mown, as the early feed in spring, when all kinds of nutritive fodder are scarce.

When it is intended to form a water-meadow on a surface which is nearly level, the whole of the land must be laid in beds about 20 or 30 feet wide, the middle or crown of these beds being on a level with the main feeders, and the bottoms or drains on a level with the lower exit of the water, or a little above it. Grass-seed being sown over these beds, the water may be let on for a very short time, to make them spring. As soon as the grass is two or three inches above ground, a regular flooding may be given, and in a very short time the sward will be complete. Instead of sowing seed, tufts of grass cut from old sward may be spread over the newly formed beds, and they will soon cover the ground.

It seems essential to the formation of a good water-meadow that the bottom be porous and free from stagnant water; hence under-draining is often indispensable before a water-meadow can be established; and a peat bog, if drained and consolidated, may have water carried over its surface, and produce very good herbage. If the soil is a very stiff clay, draining is almost indispensable where a water-meadow is to be made.

The usual time of letting on the water on water-meadows is just before Christmas, and it may continue to flow over the land as long as the frost lasts: in mild weather it may be turned off during the day and put on again at night until the frost is gone. The grass will soon begin to grow, and be ready to be fed off. When this is done, the water is immediately let on for a short time, and turned off again to allow the ground to dry after a few days' flooding, and the water is let on again at short intervals. The warmer the air is, the shorter time must the water be allowed to cover the meadows.

IRTISCH. [SIBERIA.]

IRUN. [BASQUE PROVINCES.]

IRVINE. [AYRSHIRE.]

ISABELLA of Castile. [FERDINAND V. of Castile.]

ISÆUS, one of the ten Athenian orators, was a native of Chalcis, or, according to other accounts, of Athens. The vigour of his talent belonged to the period after the Peloponnesian War which ended B.C. 404, and he lived to the time of King Philip. He was a pupil of Isocrates, instructed Demosthenes, and enjoyed the society of the chief philosophers of his time.

Eleven of the orations of Isæus are extant, all of which treat of matters relating to wills and the succession to the property of testators, or persons intestate, or to disputes originating in such matters. From these orations we derive much information about the law of Athens as to the disposition of property by will, and in cases of intestacy, and also as to many of the forms of procedure.

Dionysius says, that with Isæus originated that vigour and energy of style which his pupil Demosthenes carried to perfection.

The best edition of the text of Isæus is by Bekker. The translation of Isæus by Sir William Jones (1779, 4to.) is somewhat deficient in critical accuracy, and also wanting in force.

ISAIAH, one of the most celebrated of the Hebrew prophets, but of the time in which he lived little more is known than he has himself told us in the superscription of his book. It appears that he was the son of Amoz or Amotz, who, however was not the prophet Amos, who prophesied in Israel in the reign of the second Jeroboam. It seems tolerably clear that he was a native of the kingdom of Judah; and that he resided at Jerusalem is evident from several passages of his prophecies; that he was married; and that he had two sons in the reign of Ahaz, to whom he gave names symbolical of important events in the future history of the Jews (vii. 3; viii. 1, 2). The Scripture says nothing further of him; but the uniform tradition of the Jews is that he was put to death in the time of Manasseh, by being sawn asunder.

The prophetic ministry of Isaiah was of long duration. The superscription acquaints us that he prophesied in the reigns of Uzziah, Jotham, Ahaz, and Hezekiah. The vision in chap. vi., which has every appearance of expressing an introduction to the prophetic office, is dated 'in the year that King Uzziah died.' Uzziah died in 759 B.C.; and, as we have an explicit statement that Isaiah was engaged in his prophetic work till the fifteenth year of Hezekiah, in 712 B.C., we have an interval of 47 years, during which, at the lowest computation, Isaiah exercised his prophetic office. But it is probable that he lived much longer. Hezekiah himself lived fourteen or fifteen years after that date; and the statement in 2 Chron. xxxii. 32 that 'the rest of the acts of Hezekiah' were written 'in the vision of Isaiah,' seems to imply that he survived him, and wrote the history of his reign down to the time of his death. If he survived Hezekiah, he probably, as the tradition already alleged intimates, lived some time into the reign of Manasseh: but, if we reckon only to the first year of that reign, the interval from the last year of Uzziah is 62 years, and, supposing that Isaiah was not more than twenty at the commencement of that period, he must have been above eighty at the time of his death.

Regarded in the order of time, the writings of Isaiah would form the fifth of the prophetic books; for Joel, Jonah, Hosea, and Amos were his predecessors. Yet is this book most properly placed first in the collection, as well on account of the transcendant importance and the sublimity of the predictions which it contains, as on account of its extent—the book of Isaiah being larger than any other prophetical book, and indeed exceeding in bulk the writings of all the twelve minor prophets taken together.

The peculiar sublimity of Isaiah's prophecies both in their style and objects, has directed the attention, both of Jews and Christians, more strongly to this book than to any other in the

prophetical canon of the Old Testament. It has the very important distinction of being more frequently quoted in the New Testament than any other of the sacred books, the Psalms excepted: and the distinct manner in which the divinely inspired writer speaks of the birth and sufferings of Christ, and the glories of his kingdom, has ever rendered it eminently instrumental in the conviction of the unbelieving, in confirming the doubtful, and in strengthening the faint-hearted.

Bishop Lowth's English translation of the Prophecies of Isaiah, first published in 1778, contains a large body of useful notes, and has been frequently reprinted.

ISA'TIS. [WOAD.]

IS'CHIA, the ancient *Ænaria*, an island situated at the northern entrance of the Bay of Naples, the smaller island of Procida lying between it and the promontory of Misenum on the main land. It is mountainous. The highest summit called Epomeo, which is an extinct volcano, rises about 2500 feet above the sea. Strabo calls this island *Pithecúsæ*, from *pithécus*, an earthen vessel, the clay of the island having been used for earthenware from the remotest time. The soil is very fertile, and produces corn, abundance of wine, and all sorts of fruit. The hills are covered with chestnut trees. The island is about 20 miles in circuit, and contains 24,000 inhabitants. It contains four small towns: 1, *Ischia*, which is a bishop's see, and has a castle; 2, *Foria*, which is the most commercial place on the island; 3, *Casamicciola*, near which there is excellent clay, of which a great quantity of pottery is made and sent to Naples; and, 4, *Lacco*. The island abounds with mineral springs.

ISEGHEM. [FLANDERS, WEST.]

ISER. [BAVARIA.]

ISE'RE, a department in France, formed out of a portion of Dauphiné, is bounded E. and N. by Savoy and the department of Ain, S.E. and S. by the department of Hautes-Alpes, S.W. and W. by those of Drôme and Rhône. It lies between 44° 42′ and 45° 52′ N. lat., 4° 42′ and 6° 20′ E. long.; its length from N.W. to S.E. is 94 miles; the average width is 41 miles. The area is 3201 square miles, and the population in 1846 was 598,492, which gives 186.97 to the square mile, or 13.22 above the average per square mile for all France.

The department presents lofty mountains, which are branches of the Alps, peaks covered with snow that never melts, glaciers, dark pine forests, numberless steep, narrow, and abrupt gorges, torrents, waterfalls, and extensive plains towards the north and in the centre, the whole forming perhaps the most varied and picturesque scenery in France, ranging between the extremes of the bleakest barrenness and the most smiling and luxuriant fertility. The cols of Saix and Sept-Laux and the peaks of Granier and Belledonne, rise respectively to the height of 10,968, 9742, 9840, and 9781 feet above the level of the sea. The mountains abound in grottoes of great extent and rich in stalactitic concretions. Lakes are numerous, but small. There are no navigable canals; but canals and rills of irrigation are employed very extensively in most of the valleys and plains. Every spot capable of cultivation is carefully tilled; the mountain sides are shaped into terraces, which are formed with carried earth, supported by walls of dry-stones; and crops are grown at the height of 2700 feet above the level of the valleys.

The arrondissement of Grenoble contains no plains; the tillage is confined to the valleys and mountain slopes. The valley of Grésivaudun, remarkable for its extraordinary fertility and high cultivation, is watered in its whole length by the Isère, and extends from the point where that river enters France to its junction with the Drac in the neighbourhood of Grenoble, a length of 29 miles, with an average breadth of 3 miles. It is inclosed in its whole extent by two chains of mountains of great and varied beauty, the lower slopes of which are converted into corn fields, meadows, orchards and plantations; the central parts are covered with forests of oak, chestnut, and pine, or clothed with pasture, while the summits and crests are covered with snow or with naked rocks. In this valley the walnut, mulberry, and vine flourish. Wheat, barley, maize, hemp, clover, &c., are produced in great abundance. Rye and oats are the chief crops in the mountain districts. Oxen are employed in farm-work. Numerous flocks from this and the neighbouring departments graze upon the mountain pastures during the summer. The arrondissement of St.-Marcellin presents towards the north a vast plain, known under the names of Bièvre and Côte-St.-André, consisting of a dry gravelly soil, which is tolerably fertile and well cultivated. The centre of this arrondissement is hilly, and contains some good wheat land. Another part of the arrondissement is the valley of Tullins, a prolongation of that of Grésivaudun, to which it yields neither in beauty nor fertility. The southern part of the arrondissement of La-Tour-du-Pin, known as the Terres Froides (cold lands), consists of high ridges divided by narrow vales, while the northern part consists of hills of moderate height, intersected by moist and marshy plains. In this part are the lakes of Paladru and Lemps, and the extensive morasses of Bourgoin. The arrondissement of Vienne presents in its northern part a vast dry sandy plain, on which rye is the chief crop; in the central parts it is covered with hills, the lower slopes of which are well cultivated and very productive, while their summits are covered with wood; to the south this arrondissement comprises the extremely fertile plain of Valoir, which yields corn, wine, oil, and silk.

The department takes its name from its principal river the *Isère*, which, rising on the western slopes of the Graian Alps in the Tarentaise district of Savoy, flows in a general westerly direction to Moutiers, whence its course is N.W. for a few miles, then S.W. to its junction with the Arc and as far as Montmeillan, where it becomes navigable, and soon after enters France. Here its course is nearly S. to Grenoble, where it is joined by the Drac from the left bank: below this point it makes another bend first to N.W., then to S.W., passing St.-Marcellin, below which town it enters

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the department of Drôme, and falls into the Rhône a few miles above Valence after a course of 180 miles, 87 of which are navigable. This river, which is subject to disastrous floods, is of moderate width, but very deep; its waters are always of a blackish tint, owing to the débris which it receives from the slate quarries of the Tarentaise. Of the other streams, which are very numerous, the most important are the *Drac* [ALPES, HAUTES]: the *Romanche*, which drains the south-east of the department and joins the Drac on the right bank, a few miles S. of Grenoble: the *Bourbre*, which rises S. of Virieu, and flowing past La-Tour-du-Pin and Bourgoin enters the Rhône on the northern boundary of the department: the *Guiers*, which is formed by the union of the Guiers-Vif and the Guiers-Mort (two streams that run down from the mountains of the Grande-Chartreuse), and flows along the frontier of Savoy from Les-Echelles to its junction with the Rhône, a few miles S. of Belley. The RHÔNE forms the northern and western boundaries of the department, and is navigable. Salt and other articles are conveyed in barges from the Rhône up the Isère; the transports down the latter are iron, hemp, linen, woollen cloth, &c.

The department is crossed by 7 royal and 17 departmental roads: the Lyon-Avignon Railroad, now in course of construction, runs along the west of the department, sending off a branch from St.-Rambert to Grenoble.

The department contains 2,047,654 acres, distributed among 179,575 proprietors, and into 1,529,893 parcels. Of this area 781,837 acres are under tillage; 164,857 are pasture land; 68,446 are under vine culture; 499,695 are covered with woods and forests; 20,009 are occupied as gardens, orchards, nurseries, and plantations of different sorts; and 38,276 are covered with rivers, lakes, canals, &c. The productions are of the most varied description, including wheat, rye, barley, maize, buckwheat, peas and beans, potatoes, fruits of all kind, walnuts, mulberries, almonds, medicinal plants, hemp, &c. Vines are mostly grown in the fertile valleys, trained either to green-wood supports of maple or cherry-tree, or to dry tall poles of chestnut wood; vines thus grown are called high vines (hautins). But on the hill slopes, in favourable situations and in the Rhône district, the low vines, as they are called when unsupported, produce a stronger better-keeping wine, and more fitted for transport. The produce of wine in ordinary years is 5,324,000 gallons, the best of which is produced in the neighbourhood of the Rhône. Horses, asses, and cows are numerous, but small; mules of large size are reared in the mountains; sheep are bred in great numbers, and yield a fine silky wool; pigs, goats, and poultry are plentiful. The rivers and lakes abound in fish. Game is abundant; among the wild animals are the boar, wolf, chamois, ibex, porcupine, weasel, red and gray partridge, &c. The mulberry grounds are extensive; the number of trees exceeds a million.

The climate is healthy; cold in winter, very hot in the valleys and plains in summer. The prevailing winds are from the north and north-west; about 85 days in the year are rainy; hail-storms are sometimes very destructive.

In mineral wealth the department is very rich. Iron, lead, copper, and coal mines are worked; gold and silver mines have been worked, but are now abandoned. In the year 1837 a vein of platina was discovered in the valley of the Drac. Marble, granite, porphyry, gypsum, slate are quarried. Antimony, zinc, cobalt, rock-crystal, vitriol, sulphur are found.

The industrial products consist of sailcloth, table and household linen, gloves, soldiers' uniforms, calicoes, printed cottons, oil, turpentine, liqueurs, and mineral acids. There are iron, copper, and lead foundries, steel works, zinc and copper rolling factories, marble sawing mills, paper and vellum works, naileries, dyehouses, glass works, cotton yarn manufactories, magnaneries, and silk, throwing establishments. The number of wind and water mills is 1367; of forges and smelting furnaces, 119; of factories and workshops of different kinds, 969. About 400 fairs are held in the year.

The department is divided into 4 arrondissements, which with their subdivisions and population are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1846.
Grenoble . .	20	219	219,033
La-Tour-du-Pin . . .	7	125	136,627
St.-Marcellin .	7	84	88,029
Vienne . . .	10	126	154,803
Total . .	44	554	598,492

Of the arrondissement of Grenoble and of the whole department the capital is GRENOBLE. *Allevard* stands in a high valley N.E. of Grenoble, watered by the Breda, a feeder of the Isère, and has 2638 inhabitants, who are chiefly employed in the neighbouring iron mines, forges, smelting furnaces, and foundries, the machinery of which is driven by the Breda. *Bourg-d'Oysans*, S.S.E. of Grenoble, in the picturesque valley of the Romanche, which is hemmed in by high wooded mountains, echoing with numerous cascades, has an ecclesiastical college and 3196 inhabitants, who manufacture cotton, and work in the lead and rock-crystal mines of the neighbourhood. *St.-Laurent-du-Pont*, 20 miles N. from Grenoble, is most picturesquely situated at the foot of very high and almost perpendicular mountains, on the road to the monastery of the Grande Chartreuse, which was founded by St. Bruno in 1084 in a wild and rocky defile; population, 1734. *Mens*, 25 miles S. from Grenoble, stands among the Trièves Mountains, and has 2126 inhabitants, important linen manufactures and glass factories. *La Mure*, S. of Grenoble on the road to Gap, situated at the extremity of the valley of the Matesine, which is inclosed by the Trièves Mountains, has 3106 inhabitants, who manufacture coarse linen and leather, and work in the coal mines and marble quarries near the town. *Vif*, 10 miles S. from Grenoble, has potteries, silk throwing factories,

and 2314 inhabitants. *Villard-de-Lans*, near the right bank of the Bourne, has a population of 2298. *Vizille*, in a fertile plain on the right bank of the Romanche, has an ancient castle now converted into a factory for printed cottons, and contains 2907 inhabitants. *Voiron*, N. of Grenoble, a well-built town of 7694 inhabitants, stands at the foot of a hill on the Morge, a small feeder of the Isère, which drives the machinery of several industrial establishments. The principal manufactures are cloth, silk stuffs, canvass, liqueurs, soap; there are also iron and steel works, paper and hemp mills, naileries, and tan-yards. *Voreppe*, S. of Voiron, has oil and corn mills, tan-yards, and 3005 inhabitants.

In the arrondissement of La-Tour-du-Pin the chief town, *La-Tour-du-Pin*, stands on the left bank of the Bourbre, on the road from Lyon to Chambéry, and has 2456 inhabitants, and some beet-root sugar factories. It was formerly important on account of its fortifications, of which there are still some remains. The tribunal of first instance is at *Bourgoin*, a town of 4271 inhabitants, situated among hills at the junction of three small rivers, and at the point where the Lyon road branches off southwards to Grenoble, and eastwards to Italy through Chambéry. Its situation is favourable for trade, but unhealthy on account of the marshes and bogs near it. Its manufactures are printed calicoes, canvas, cotton cloth and yarn, thrown silk, and beet-root sugar; there are also several flour mills. *Crémieux*, 6 miles N. from Bourgoin, has 2292 inhabitants, and is famous for its poultry. It stands at the foot of a chain of calcareous hills, in which is the famous grotto of *La Balme*, reckoned as one of the seven wonders of Dauphiné. The grotto consists of two long galleries, one facing the entrance, the other to the right, and both contain beautiful stalactites; in the former there is a lake of pellucid water, the transit of which to and fro occupies one hour, and is made by torch-light in a boat kept for the purpose. *Le-Pont-de-Beau-Voisin*, on the Guiers, here crossed by a bridge of one arch, the line joining the keystones of which marks the boundary between France and Savoy, has 2268 inhabitants.

In the arrondissement of St.-Marcellin, the chief town, *St.-Marcellin*, is situated 20 miles W. from Grenoble, in a pretty country at the foot of a vine-clad hill, at a short distance from the right bank of the Isère, and has a tribunal of first instance, a college, and 3116 inhabitants. The town is surrounded with walls pierced by four gates; it is well built, with straight streets, ornamented with fountains. *St.-Etienne-de-St.-Geoirs*, 10 miles N. from St.-Marcellin, on the Doleur, has a population of 2051. *Rives*, N.N.E. of St.-Marcellin, is situated in a smiling valley, watered by the Fure, and has 2270 inhabitants. This town is the centre of considerable manufactures of iron, steel, paper, crape, and silk handkerchiefs; the steel forges, of which there are 23 in the town and neighbourhood, are famous for the excellence of their products. *Roybon*, N.W. of St.-Marcellin, has manufactures of coarse woollens and 2288 inhabitants. *Tullins*, formerly a well-fortified town, stands a few miles S. of Rives in a beautiful valley, and has 4701 inhabitants. It is surrounded by iron forges, steel works, copper foundries, and hemp-dressing establishments. Arms and tools of various kinds are manufactured here. *Vinay*, 5 miles N.E. from St.-Marcellin, has iron works, silk-throwing establishments, and 3351 inhabitants.

In the arrondissement of Vienne the chief town is *Vienne*, the *Vienna* of the Allobroges and the capital of the first and second kingdoms of Bourgogne. It stands in 45° 31′ 28″ N. lat., 4° 52′ 11″ E. long., at a distance of 50 miles N.W. from Grenoble, on the left bank of the Rhône, which is lined with quays and crossed by a suspension-bridge. The town has tribunals of first instance and of commerce, a consultative chamber of manufactures, a college, and 17,587 inhabitants. Hemmed in between steep hills and the river, Vienne has a much greater length than breadth; it is like most ancient towns, ill-built, with narrow winding streets, with the exception of that traversed by the road from Lyon to Marseille. It contains some Roman remains, among others a temple now converted into a museum, a triumphal arch, some vestiges of an amphitheatre on Mont-Pipet, and S. of the town, near the gate of Avignon, a pyramidal obelisk, called Plan-de-l'-Aiguille, which is 46 feet high, and constructed with cut stone without cement. The modern structures of most note are the fine Cathedral of St.-Maurice, the church and cloisters of the former abbey of St.-André-le-Bas, the cavalry barracks, the public library of 10,000 volumes, the college, which is one of the finest structures of the kind left by the Jesuits, the hospitals for the sick and poor, the corn market, and the abattoir. The Gère, which joins the Rhône at Vienne, drives the machinery of several factories. This town is one of the principal seats of the woollen manufactures in the south of France; common cloth, pasteboard, soap, leather, glass bottles, paper, chemical products, &c., are also made; and there are establishments for reeling and throwing silk, dye-houses, iron furnaces, steel works, sheet copper and lead works, copper and brass foundries. The commerce of the town is composed of its industrial products, and of wine, zinc, &c. Vienne formerly had an archbishop of its own; but the archiepiscopal province is now united to that of Lyon. *Beaurepaire*, S.S.E. of Vienne, has cloth factories, corn and fulling mills, and 2322 inhabitants. *La-Côte-St.-André* stands at the foot of a hill, in a pretty situation on the Frette, 21 miles S.E. from Vienne, and has 4083 inhabitants, who manufacture liqueurs, pyroligneous acid, wax candles, and plate glass. *St.-Jean-de-Bournay*, 14 miles E. from Vienne, on the Veronne, a small stream that drives the machinery of several factories and then loses itself underground, has 3492 inhabitants, who manufacture woollen plaids, beet-root sugar, and leather.

The department forms the see of the bishop of Grenoble; is included in the jurisdiction of the Cour Royale of Grenoble, and of the University Academy of Lyon; and belongs to the 7th Military Division, of which Lyon is head-quarters. It

formerly returned 7 members to the Chamber of Deputies: it now has 15 representatives in the National Assembly.

(*Dictionnaire de la France*; *Statistique de la France*; Richard, *Guide Classique du Voyageur en France*; *Decree of the Provisional Government of the French Republic.*)

ISIDORE of Charax lived probably in the first century of our æra. It appears from Athenæus ('Deip.' iii.) that he wrote an account of the Parthian empire, of which there is only a small part extant, entitled Σταθμοὶ Παρθικοί, or the 'Parthian Halting-places.'

This work has been printed in the second volume of Hudson's 'Geographiæ veteris Scriptores Græci Minores,' with a Dissertation by Dodwell. There are some remarks on the 'Parthian Halting-places' in the 'Journal of Education,' vol. ii. p. 305.

ISIDORE, SAINT, of Pelusium in Egypt, lived in the beginning of the fifth century, and wrote, according to Suidas, '3000 epistles, explaining the divine Scriptures.' Upwards of 2000 are still extant. They have been published in Greek and Latin by Scholt, Paris, 1638. Dr. Heumann has published a 'Dissertation on Isidore' (Hanover, 1738, 4to.), in which he argues that most of the letters are fictitious, and not a real correspondence.

ISIDORE, SAINT, bishop of Seville, from A.D. 595 or 596 to A.D. 636, was born at Carthagena. He was considered by the Council of Toledo (A.D. 650) as the most learned man of his age. The works of Isidore, which are numerous, have been published by Du Breul, Paris, 1601, and Cologne, 1617; at Madrid, 1778, and by Arevali, Rome, 1797, 1803.

ISINGLASS, one of the purest kinds of glue, or animal gelatin, is made chiefly in Russia, from the dense membrane which forms the air-bladder of the sturgeon and other fishes of the same family (*Sturionidæ*).

ISIS, one of the chief deities of the Egyptians, the sister of Osiris, was represented as the Goddess of Fecundity, and the cow was sacred to her. The annual festival of Isis in Egypt lasted eight days, during which a general purification took place. The priests of Isis observed perpetual chastity, their heads were shaved, and they went barefooted. The goddess was often represented as a woman with the horns of a cow. She also appears with the lotus on her head and the sistrum in her hand; and her head in some instances is seen covered with a hood. Heads of Isis are a frequent ornament of Egyptian capitals on the pillars of the temples.

ISLAM. [MOHAMMED.]

ISLAY. [HEBRIDES.]

ISLE, River. [DORDOGNE.]

ISLE-MADAME. [CHARENTE-INFE'RIEURE.]

ISLE-ROYALE. [CAPE BRETON; CANADA.]

ISLE-EN-JOURDAIN. [GERS.]

ISLE, L'. [VAUCLUSE.]

ISLE D'ALBI. [TARN.]

ISMAELITES, or ISMAELIANS, were originally a branch of the Shiites, or followers of Ali ben Abi Taleb. Djafar Madeck, the sixth Imaum in a direct line from Ali, having lost his elder son Ismael, appointed his younger son Mousa to be his successor. This caused a schism among the Shiites in the second century of the Hegira. Those who contended that the office of Imaum ought to have descended to the posterity of Ismael, and not to his younger brother, were called Ismaelites. They established two powerful dynasties, one in Egypt, and another in the Irak Ajemi of Persia. The Ismaelites of Persia, Syria, and Arabia, had frequent wars against the Abbaside caliphs and the other Sunnee Mussulmans, until the dynasty of Casbin was overthrown by the Tartars about the middle of the thirteenth century. After that time the Ismaelites became scattered through Asia, maintaining their tenets and observing their rites in concealment and obscurity.

ISMAIL. [BESSARABIA.]

ISNARDIA, a genus of plants belonging to the natural order *Onagrarieæ*. There is one British species of this genus, *I. palustris*. *I. alternifolia* is a native of Virginia and Carolina, in marshy places. The root is used as an emetic.

ISOCA'RDIA, a genus of bivalve shells, or conchifers, placed by Linnæus under the form *Chama*, and by Brugnière among the *Carditeæ*. Lamarck places Isocardia as the last of the genera of his *Cardiacées*, separating it from Chama, as Mr. G. B. Sowerby thinks with good reason ('Genera of Recent Fossil Shells'). M. de Blainville alters the term into *Isocardium*, and inserts it as a genus between *Tridacna* and *Trigonia*, among his *Camacés*. M. Rang retains it in the same family, but restores Lamarck's original termination of the name, and places it between *Caprina* and *Tridacna*. ('Zool. Journal,' vol. ii. p. 359.)

The species are limited in number, and belong to the seas of Europe, India, and Australia. Example, *Isocardia Cor*. Europe.

Fossil Isocardiæ.—In Sowerby's 'Mineral Conchology' several fossil species are given in plate 295. They occur in the London Clay, in the Crag, and in the Tertiary Beds of Europe and America.

(Deshaye's *ed. of Lamarck*; Lea's *Contributions to Geology*, 8vo., Philadelphia, 1833.)

ISOCHROMATIC LINES are those coloured rings which appear when a pencil of polarised light is transmitted along the axis of a crystal, as mica or nitre, and is received in the eye after passing through a plate of tourmaline. In certain circumstances these rings assume the forms of con-polar lemniscates; and the tint of any one is represented by the rectangle contained by two lines drawn from the poles to any point in the curve.

ISOCHRONOUS, ISOCHRONISM (ἴσος, equal, χρόνος, time). Vibrations or oscillations which are performed in equal times are called isochronous; and isochronism is the name given to a remarkable property of all systems which are in equilibrium, namely, that when slight disturbance, be the same more or less, is given, the oscillations which take place are all performed in the same time, or so nearly in the same time, that any acceleration or retardation is totally imp

ceptible. Thus, when a pendulum is allowed to vibrate till it rests, it will be found that there is no perceptible difference between the vibrations of longer and shorter extent; of which any reader may satisfy himself by attaching a weight to a string, and observing the vibrations. But a still better proof may be found in a musical string. The finest ear cannot detect any difference between the pitch of a note made by a smart blow on the key of a pianoforte and that made by a gentle one; yet a very small difference in the number of oscillations per second would be perceptible, and the amount of disturbance from the position of equilibrium is twenty or thirty times greater in the first case than in the second.

When, under two different circumstances, the longer space is described in the same time as the shorter, it must be that the force acting in the first case is greater than that in the second; and it is sufficiently known from experience that, the more a system at rest is disturbed, the greater is the effort which it makes to return. But, in order that there may be isochronism, it is not sufficient that the effort to return should increase with the amount of disturbance, but the increase must take place according to one particular law. This law is as follows:—the force of restitution must be always proportional to the disturbance, so that, whatever force begins to act when the disturbance is a, twice as much acts when the disturbance is twice a; and so on for all proportions. That this law does prevail when the disturbance is not great, either absolutely, or so nearly that its error is extremely small, may be proved both by theory and experiment.

ISO'CRATES, one of the Greek orators commonly called the Ten, was born at Athens, 436 B.C. He studied rhetoric under Pródicus, Gorgias, Tisias, and Therámenes, and became a master of his art. A certain timidity and feebleness in his delivery prevented him from speaking in public. He taught rhetoric both at Chios and at Athens, and his school was attended by numerous disciples, among whom were Xenophon, Ephorus, and Theopompus. Isæus, Demosthenes, and others, are said to have studied under him. The orations of Isocrates were either sent to the persons to whom they were addressed for their private perusal, or they were intrusted to others to deliver in public. He is said to have delivered only one himself. Isocrates treated of great moral and political questions: his views are distinguished by a regard for virtue, and an aversion to all meanness and injustice. He was a friend of peace; he repeatedly exhorted the Greeks to concord among themselves, and to turn their arms against their common enemy Persia. In his 'Panegyrical Oration' (published about B.C. 379), which he wrote in the time of the Lacedæmonian ascendancy, he exhorted the Lacedæmonians and Athenians to vie with each other in a noble emulation, and to unite their forces in an expedition against Asia. He addressed Philip of Macedon in a similar strain after his peace with Athens (B.C. 346), exhorting him to reconcile the states of Greece, and to unite their forces against Persia. He displayed considerable courage on several occasions, as when he showed his sympathy for Theramenes, who had been condemned by the thirty tyrants. On the news of the battle of Chæronea, he refused to take food for several days, and thus closed his long career at ninety-eight years of age, B.C. 338.

There are extant eight orations of Isocrates of the class called judicial, or forensic, which are valuable for the subject matter. Three of the orations of Isocrates—to Demonicus, to Nicocles, and the oration entitled Nicocles, belong to the paraenetic or hortatory class, and the first two partake in some degree of the epistolary style. The 'Panathenaicus' is a panegyric of Athens, which he wrote when he was 94 years of age. ('Panath.,' c. 1.)

The style of Isocrates is perspicuous, but highly laboured, and somewhat diffuse. In Cicero's opinion it was he who first gave to prose writing its due rhythm. Dionysius has thus briefly summed up his comparison between Lysias and Isocrates. 'As to the charm of composition, Lysias is superior to Isocrates in the same kind that a naturally handsome person is to one made so by art: the composition of Lysias pleases naturally; that of Isocrates aims at pleasing.' Twenty-one of his orations have come down to us, together with a few epistles, probably not genuine. The best edition of the Greek text is by Bekker. Isocrates was translated into English by Richard Sadleir, London, folio (no date); by Dinsdale, London, 1752, 8vo.; and by Gillies, together with the 'Orations of Lysias,' London, 1778, 4to.

ISOCRINITES, a genus of *Crinoidea* (Goldfuss).

I'SOETES, a cryptogamic genus of plants, belonging to the natural order *Lycopodiaceæ*. The species of Isoetes grow at the bottoms of ponds and lakes, and are said to afford excellent food for fish. They are called Quillworts from the rush or quill-like appearance of the leaves. *I. lacustris*, Quillwort, is found in Great Britain, at the bottom of lakes and ponds in hilly districts. The structure of the fructification of this plant, and other species of the genus, is only imperfectly understood. It is on this account referred to *Marsilleaceæ* by some authors, and made to form an independent order by others. Lindley refers it to *Lycopodiaceæ*.

ISOMERISM. Substances which contain the same elements in the same ratio, and yet possess physical and chemical properties quite distinct, are classed as *isomeric*, *polymeric*, and *metameric* substances.

Isomeric bodies are those which contain the same absolute and relative number of atoms of the same elements, and have consequently the same atomic weight. Should any such be found, it is evident either that they must contain more than two elements, or two equivalents of one, if there be only two; but it is not certain that any such exist, although Berzelius believed that he had met with a few examples.

Polymeric substances are those which contain the same relative but not the same absolute number of atoms of the same elements, and whose

atomic weights are consequently unlike. Several carburets of hydrogen offer examples of polymerism.

Metameric substances are those which, while they contain the same absolute and the same relative number of atoms of the same elements, yet constitute substances belonging to an entirely different class of bodies, or a different order of chemical compounds. There are several substances of this kind.

ISOMORPHISM. In the year 1819 it was found by Mitscherlich that certain substances which have the property of assuming the same crystalline form may be substituted for each other in combination without altering the form of the crystal. Thus crystals which have the aspect and form of alum, a salt which is well known to contain sulphate of potash and sulphate of alumina, may be made with sulphate of potash and persulphate of iron; hence it is concluded that alumina and peroxide of iron are isomorphous. This property, which he termed *isomorphism*, or equal forms, Mitscherlich announces thus:—'that certain elements which are themselves isomorphous, when combined in the same manner with the same substance, communicate the same form;' and he proceeds to state, in illustration of this doctrine, 'that similarly constituted salts of arsenic acid and phosphoric acid yield crystals of the same figure, because the acids, it is thought, are themselves isomorphous; and as the atomic constitution of these acids is similar, each containing the same number of atoms of the other ingredient, it is inferred that phosphorus is isomorphous with arsenic.' Several isomorphous groups of crystals have been determined; but the strictness of their isomorphism is not without doubt in the minds of some authorities.

As connected with the subject of isomorphism, it will be proper to notice two other classes of bodies, which have been termed *dimorphous* and *isodimorphous* substances.

The case of dimorphism first ascertained was presented by carbonate of lime in the two incompatible crystalline forms of common calcareous spar and of arragonite. Another instance is that of sulphur, which, when crystallised from fusion, differs essentially in its form from the natural crystals and those deposited from bisulphuret of carbon. So also the diamond and graphite, which are both pure carbon, crystallise in forms which are incompatible with each other.

The term isodimorphous is proposed by Professor Johnstone to express the fact that two substances known to be dimorphous, the carbonates of lime and lead, crystallise each in two forms, the analogous pairs of which are also isomorphous.

ISONZO. [ILLYRIA.]

ISO'PODA, Latreille's name for the fifth order of Crustaceans. Some of these crustaceans are aquatic in their habits, others are terrestrial, and many of the aquatic species are parasitic. The feet are always fourteen in number unguiculated, and without any vesicular appendage at their base. The two anterior feet are not annexed to the head, but like the succeeding ones depend upon their particular segment. The under part of the tail is furnished with appendages which are very apparent, and in the form of leaflets, or vesicular purses. Of these, the first two, or external ones, ordinarily cover the others, either totally or in great part. The body is generally flattened and wider than it is thick. The mouth is composed of the same pieces as in the crustaceans which precede it in M. Latreille's system, but in the order before us those which answer to the two superior jaw-feet in the *Decapods* present more the appearance of a lower lip terminated by two palpi. Two of the antennæ, the mesial ones, are almost obliterated in the last genera of this order, which are all terrestrial, and differ besides from the other by their respiratory organs. The male sexual organs are pointed out most frequently by the presence of linear or filiform appendages, and sometimes by hooks placed at the internal origin of the first subcaudal laminæ. The females carry their eggs under the breast, either between the scales, or in a membranous pouch, or sac, that opens to afford a passage for their young, which are hatched with the form and parts proper to the species, and only cast their skin as they increase in size. The greater number live in the waters. Those which are terrestrial have need, like other crustaceans that live out of water, of a certain degree of atmospherical humidity, in order that respiration may be carried on, and that their branchiæ may be in a fit state for performing this function. Latreille divides the Isopods as follows:—

1. *Epicarides.* Parasitical. Genus, *Bopyrus.*

2. *Cymothoada.* With four setaceous antennæ. Genera—*Serolis*, according to Dr. Buckland, allied to the extinct Trilobites, *Cymothoa, Ichthyophilus, Canolira, Aga, Rocinella, Conilira, Synodus, Cirolana, Nelocira, Euridice, Limnoria.*

3. *Sphæromides.* Genera—*Zuzara, Sphæroma, Næsa, Cilicæa, Cymodocea, Dynamene, Anthura.*

4. *Idoteidæ.* Genera—*Idotea, Stenosoma, Arcturus.*

5. *Asellota.* Genera—*Asellus, Oniscoda, Jæra.*

6. *Oniscidæ.* Genera—*Ligia, Tylos, Philosocia, Oniscus, Porcellio, Armadillo.*

(Latreille, in Cuvier's 'Règne Animal;' Desmarest; Milne Edwards; Lamarck, 1838; and others.)

Fossil Isopoda.—M. Latreille states that Professor Germar had sent to M. le Comte Dejean the figure and description of a small fossil crustacean which appeared to him (M. Latreille) to be referable to the sub-genus *Limnoria.* M. Desmarest ('Histoire Naturelle des Crustacés Fossiles') enumerates two fossil species of the genus *Sphæroma*: one, *Sphæroma antiqua*, found in a fragment of white fine-grained calcareous stone analogous in that respect to the Pappenheim stone but of which he knows not the origin; the others *Sphæroma Margarum*, from the horizontal bed of green fissile marl at Montmartre, above the gypsum beds, mingled with *Spirorbes.*

ISOPYRE, a mineral which occurs in granite. It is brittle, grayish black, translucent, and slightly magnetic. It consists of silica, alumina, lime, peroxide of iron, and oxide of copper.

ISO'SCELES (ἴσος, equal, σκέλος, leg), a term applied to a triangle of which two sides (or legs) are equal.

ISOTELUS, a genus of fossil Crustaceæ (Trilobites) from the Silurian strata, especially of North America. (Green.)

ISOTHERMAL LINES are curves supposed to be traced on the surface of the earth so that each may pass through a series of points at which the mean annual temperature of the air is the same. The situations of such points were first determined by M. Humboldt from the registers of observed temperatures in Europe, and from the numerous observations made by himself and other travellers in different regions of the world. The mean annual temperatures of places remain nearly the same, but they decrease in going from the equatorial regions towards either geographical pole; and Professor Mayer of Göttingen appears to have been the first who attempted, from such observations as existed in his time, to express the law of the decrease by a formula. He made the temperature on any parallel of terrestrial latitude to depend on the square of the cosine of the latitude, and with some modifications this law is even now generally admitted. At the level of the sea the value of the mean annual temperature is expressed by $M + E \cos. 2L$; where L is the latitude of the place, M is the mean temperature on the parallel of 45°, and $M + E$ is that at the equator.

In the northern hemisphere, as we proceed eastward and westward from the meridians of Greenwich or Paris, it is found that the mean temperature on any parallel of latitude becomes continually less, and the severity of the winter greater than in this part of the world; and M. Humboldt found that between the parallels of 28° 25′ N. and 41° 53′ N. the difference between the latitudes of a place in Europe and a place in North America, having the same mean temperature, is about 7°.

The period during which a traveller remains in any one place will seldom allow him to make a sufficient number of observations for determining its mean annual temperature by the process above mentioned; and therefore it may be useful to know that, according to Humboldt, the mean temperatures for the months of October and April are very nearly equal to the annual mean temperature; also that the half sum of the temperatures at sunrise and at 2 P.M. is nearly equal to the mean temperature for the day. It may be proper to remark also that travellers, in making observations relating to temperature, should be careful to place their thermometers at some distance above the surface of the ground, and in situations where they may be unaffected by the reflection or radiation of heat from buildings, or from terrestrial particles in the atmosphere. The very high temperatures which have been occasionally observed in sandy deserts are probably owing in part to the latter circumstance.

The isothermal line of 32° passes about 4° southward of Nain, a Moravian settlement on the coast of Labrador; and, continuing eastward through a point about 1° N. of Umea in Sweden, it there makes a remarkable inflexion. After ascending as high as North Cape in Lapland, it abruptly returns southward, and attains its lowest limit in the eastern parts of Asia. Proceeding westward from Labrador, recent observations have shown that the curve descends towards the south, and crosses the lower extremity of Hudson's Bay, from whence it again tends northwards to the Great Slave Lake. The positions of the other curves seem to be influenced in some measure by that which has been just mentioned. In their progress from the western coast of Europe to the eastern coast of America they incline towards the terrestrial equator, yet so that the southern curves approach very near to parallelism with that great circle of the earth. At about 10° eastward of the meridian of Greenwich the curves have their convexities turned northwards; and farther eastward they descend towards the equator. The isothermal line of 54.5° alone has been traced nearly round the earth: commencing at the mouth of the Columbia, on the western coast of North America, it passes near the city of Washington with its convexity towards the south; and, after crossing the Atlantic, it runs through Bordeaux, from whence it continues to the city of Pekin, at which place it again becomes convex towards the equator. From the observations of Sir Edward Parry and Sir John Franklin, it appears that there are in the northern hemisphere two poles of maximum cold; both, conformably to the determination of Sir D. Brewster, are on the 80th degree of N. lat., one in 95° E. long., and the other in 100° W. long.

But in every country the mean temperature varies with the height of the place above the level of the sea; and Mr. Atkinson, in the 'Memoirs of the Royal Astronomical Society,' vol. ii., from a comparison of many observations, makes the diminution equal to 1° Fahr. for every 251.5 feet. He has also shown that the differences of temperature between summer and winter begin to diminish at the height of about 21,000 feet above the surface of the earth.

The curves formed by connecting, on the isothermal lines, points at which the mean temperature of summer is the same, are called *isotheral lines;* and those formed by connecting points at which the mean winter temperature is the same are called *isocheimal lines:* both these systems of lines deviate more than the isothermal lines from the parallels of terrestrial latitude. Curve lines connecting points on the ground at which the mean annual temperatures of the soil are equal, are called *isogeothermal lines;* and, according to Sir D. Brewster, these are always parallel to the isothermal lines.

It was long supposed that the mean temperature of the southern was much lower than that of the northern hemisphere; but the observations which have within a few years been made on the temperature of the southern regions afford good reason to believe that there is little difference between the mean annual temperatures of places similarly situated in the two hemispheres.

M. Humboldt considers the mean annual temperature at the equator, at the level of the sea, to be equal to 81.4° Fahr.: but Mr. Atkinson ('Memoirs of the Royal Astronomical Society,' vol. ii.) found that the mean temperature is there at least equal to 84.5°.

By comparing the mean temperature at Van Diemen's Land with that of the Cape of Good Hope, Sir D. Brewster concludes that in the antarctic regions there are two points of maximum cold whose situations correspond to those in the northern hemisphere. But it is evident that observations must be greatly multiplied in both hemispheres before the data can be considered sufficient for the construction of formulæ for temperature in which full confidence may be placed.

It is found, on boring into the earth, that the temperature increases at the rate of 1° (Fahr.) for every 50 feet in depth. In the arctic regions the temperature of the ocean increases, but between the tropics it is found to decrease, with the depth. At certain distances below the surface of the ground, which in Europe is between 50 and 100 feet, the temperature is found to be invariable.

ISPAHAN. [Persia.]

ISRAEL, TRIBES OF. [Judæa.]

ISSOIRE. [Puy-de-Dôme.]

ISSOUDUN. [Indre.]

ISSUE is an ulcer artificially formed for the purpose of maintaining a constant purulent discharge from the body. It is usually made by placing one or more beads or peas on an incision through the integuments in one of the limbs, or in the neighbourhood of a diseased part, and there retaining them by adhesive plaster, so as to prevent the wound from healing, and keep it in a constant state of suppuration. Other issues are made by rubbing caustic potash, or potash and quicklime, on a part of the skin till it is destroyed and sloughs, and by keeping open the ulcer thus formed, either with peas or very stimulant dressings. Setons are another form of issue, made by passing a broad flat needle beneath a portion of the skin, and retaining in the passage thus formed either a skein of silk or a flat band of caoutchouc. The moxa and the actual cautery are also sometimes employed with the same view.

Issues are sometimes had recourse to in order to restore an habitual discharge which has been checked by the cure of any chronic local disease, and the cessation of which has seemed to give rise to congestion of the head or of any internal organ. But the principal value of issues is as counter-irritants, by establishing a disease which is of itself unimportant in the neighbourhood of one which by its situation is more serious; and hence they are amongst the most important means in the cure of chronic inflammations of many internal organs, and especially of those of the joints and of the spine.

ISSUE. (Law.) [Pleading.]

ISSUE PEAS are round bodies employed for the purpose of maintaining irritation in a wound of the skin which is called an issue. It is a matter of indifference of what substance the peas are composed, so long as they do not introduce poisonous matters into the wound. The common garden pea is frequently used. It is however more common to use the young unripe fruits of the common orange. The fruits are dried and afterwards turned in a lathe before they are used as issue peas. The unripe oranges, dried, are sold under the name of orangettes or Curaçoa oranges. The root-stock of the *Iris Florentina* is also formed into peas and used for keeping up the discharge from issues.

ISTHMIAN GAMES were one of the four great national festivals of Greece, the others being the Olympian, Pythian, and Nemean. They were celebrated under the presidency of the Corinthians, near Corinth, on the isthmus which connects Peloponnesus with the continent, and were celebrated at intervals of four years, corresponding with the recurrence of the other festivals above mentioned, so that each year had its solemnity. The crowns for the victors were of pine leaves.

ISTRES. [Bouches-du-Rhône.]

ISTRIA. [Illyria.]

ITALIAN ARCHITECTURE. [Civil Architecture.] Instead of comprising buildings of every style and class to be met with in Italy, the term Italian Architecture is generally restricted to signify that generic style formed by the revival of the Roman orders, and the adaptation of them, and other features derived from works of the same age, to buildings of every kind, domestic as well as public.

Different orders, or repetitions of the same order, being applied to the several stories of buildings whose fronts were pierced with windows, it became unavoidably necessary to abandon all proportion of intercolumniation, and to space the columns according to the breadth of the piers and the apertures between them; which in turn left hardly any other alternative than to engage the columns themselves, that is, to attach either half or three-quarter columns to the walls.

One defect attending this practice of giving a separate order to each story is, that the columns become insignificant, both in proportion to the entire front and to the windows between them, more especially when the columns are further shortened by being placed on pedestals. In fact, windows and doors are generally the predominant features in Italian composition, even where two series are comprised within one order, being generally more prominent in their cornices and pediments than the other projections. They are often decorated with smaller columns or pilasters (as in the front of the Atlas Fire Office, Cheapside, and that of the Legal Assurance Office, Fleet Street), and Palladio has sometimes loaded them by recumbent figures on the raking cornices of their pediments. Probably the Italian style exhibits itself to most advantage where columns have been discarded, and windows and arches made the chief features in the composition, and the façade crowned by a bold and rich *cornicione*.

ITALIAN DRAMA. After the long sleep of the true dramatic and theatrical spirit in the middle ages, the first endeavour to imitate the antients in their theatre, as in other departments of art and poetry, was made by the Italians. Among these first essays we find the 'Philodoxeos, o l' Amico della Gloria' of Leon Battista Alberti; and others might be cited, which, written first in Latin and afterwards in Italian, combined in like manner all the elements of tragedy, comedy, and pastoral, but with a thorough independence of classical rules. The first specimen of the Grecian

or Greco-Roman comedy that was presented to the Italians in their own language was a translation by Collennuccio, of the 'Amphitryo' of Plautus; and, soon after, Bojardo brought upon the stage 'Il Timone Misantropo.' This was about the commencement of the 16th century; and in 1529 was performed at Bologna, in the presence of the Emperor Charles V. and Pope Pius VII., 'The Three Tyrants' (I Tre Tiranni) of Agostino Ricchi, a piece which is now chiefly worthy of notice as marking the commencement of the long war between the *classic* and the *romantic* species, to the latter of which it belonged. In opposition to this school, the first example of a *regular* modern tragedy had been given in the 'Sophonisba' of Trissino, who was followed by Ariosto, Bibbiena, and Macchiavelli. Of these, Ariosto was the closest imitator of the antients. The comedies of this time were distinguished equally for their wit and their licentiousness: those of Aretino and Ludovico Dolce stand pre-eminent in both.

Among the successful comic poets of this period, the most distinguished was Giambattista de la Porta, who flourished at the close of the 16th century and the beginning of the 17th. Though most of his comedies were of the familiar species, and some of them even bordered on farce, yet a few rose to the noble and pathetic tone: of the latter kind are 'La Furiosa,' 'La Cintia,' 'Le Due Fratelli Rivali,' 'La Sorella,' and 'Il Moro.' But the Spanish theatre was now approaching the meridian of its glory; and the political influence of Spain on the Italian territory being at its height greatly favoured the introduction of the Spanish taste in dramatic composition. These circumstances gave birth to such pieces as 'La Donna Costante,' and 'L'Amante Furioso' of Raffaele Borghini, 'L'Erofilomachia,' 'La Prigione d'Amore,' and 'I Morti Vivi' of Sforza d'Oddi, the very titles of which indicate the school to which they belong. It was probably the first extravagances of this dramatic innovation that induced Tasso, in his latter days, to compose, as a burlesque of the new romantic taste, a play entitled 'Love Intrigues' (Gl' Intrichi d'Amore), which was acted in 1598 and printed in 1604. We find a curious evidence of the transitional state of the public taste at this time in the productions of a poet of high name who thought fit to try his powers in each of the rival species. This was Michel Angelo Buonarroti the Younger, nephew of the great Michel Angelo, who composed two comedies entitled 'La Tancia' and 'La Fiera.' 'La Tancia' is a rustic comedy, in which nearly all the characters speak the country dialect of Tuscany. 'La Fiera' (the Fair) is a connected series of five plays in five acts each, which were performed at Florence on five successive nights. A vast variety of characters are introduced for the purpose of exhibiting instances of the various technical terms used in the various professions and trades of Tuscany. [BUONARROTI.]

Ottavio Rinuccini introduced the *opera per musica*, which we now briefly term the opera. At the same time the public continued their favour to a species of comedy, or rather comic recitation, which in Italy seems to have been in all times peculiarly national. This was called the *commedia a soggetto* or *commedia dell' arte*. It consisted of the mere outline of a dramatic composition, wherein the parts very slightly sketched were assigned to the several performers, who were to fill them up extemporarily. These sketches were called *scenarj*, from their containing merely the argument of each scene: those of the comedian Flaminio Scala were particularly celebrated. This species of entertainment however gradually lost its charm among the polite, and was eventually abandoned to the populace.

At the commencement of the 18th century the French taste began to invade the Italian theatre, and in the *reform* or *purification*, as the endeavours to follow the classic steps of the French were denominated, Maffei led the way in the tragic department. He printed a selection of the tragic attempts of the 16th and 17th centuries, which were for the most part marvels of dullness and absurdity, and produced a tragedy of his own, entitled 'Merope,' which obtained a high reputation from its competition with Voltaire's tragedy on the same subject.

The task of classicising the musical drama was undertaken first by Apostolo Zeno, and afterwards, with more success, by the Abate Metastasio. The first endeavour to restore what the classicists denominated the *true comedy* was made by Luigi Riccoboni, a theatrical manager, who made an unsuccessful attempt, on the Venetian stage, to revive the 'Scolastica' of Ariosto. Better fortune awaited Carlo Goldoni, a Neapolitan, who displayed such abundant nature and fertility in painting the manners and the follies of his own age and country, that at length he brought the comedy of *character* into vogue. He was for a time driven out of the field by the fantastic dramas of Gozzi, which were fairy tales adapted to the stage, and sometimes Spanish plays remodelled. Goldoni retired to Paris. There, by his production of 'Le Bourru Bienfaisant,' &c., he had the satisfaction of exhibiting himself to the French as the ablest follower that had yet appeared in the track of Molière.

It is a remarkable instance of the sway which French criticism at that day exercised over the European continent, that Goldoni's Parisian success mainly contributed to his speedy reinstatement in Italian favour. From the pen of Goldoni we have about a hundred and fifty pieces. Among the comic dramatists of his own country he still occupies the highest place.

Goldoni had many followers, among the more distinguished of whom we may mention Francesco Albergati Capacelli, a Bolognese; Camillo Frederici, a Piedmontese; Gherardo de' Rossi, and the Count Giraud, both Romans; Alfieri, in his comedies; Giulio Genoino, a Neapolitan; and Alberto Nota, a Piedmontese.

In the latter part of the last century, Alfieri opened a new æra of Italian tragedy. He adhered to the established classic school, took his subjects chiefly from antient story, and was a strict observer of the unities. As a dramatist, he has been the most successful in painting, as in his

'Virginia,' the public life of the Roman republic; and in his tragedy of 'Saul' we find, with a certain oriental splendour, great lyrical sublimity of expression. Since Alfieri, that nobler and more masculine-spirited Italian tragedy, of which he is regarded as the founder, has been cultivated by several distinguished writers with a less rigid adherence to antique subjects and to classic forms. Among the most estimable of these recent productions we may particularise the 'Aristodemo,' the 'Cajo Gracco,' and the 'Galeotto Manfredi,' of Vicenzo Monti; 'Il Conte di Carmagnola,' and 'L'Adelchi,' of Alessandro Manzoni; and the 'Antonio Foscarini,' the 'Giovanni da Procida,' the 'Ludovico Il Moro,' and the 'Nabucco' of Giovan Battista Niccolini.

ITALY, one of the great natural divisions of Europe, extends from 37° 55′ to 46° 32′ N. lat., and from 7° to 18° 30′ E. long. The northern part of Italy is bounded on the north, north-east, and north-west, by the Alps, which sweep round it in a semicircle, beginning from the coast near Nizza, on the Mediterranean, and extending to the Adriatic in the neighbourhood of Trieste.

The ridge of the Apennines divides Italy into two distinct regions. One of these regions is situated north of the Apennines, and is chiefly occupied by the basin of the Po and its numerous affluents; while the other region, which is the real peninsula, extends in a south-east direction, between the Adriatic and the Mediterranean seas for above 500 miles, its breadth varying from 130 to less than 50 miles. The Apennines, and the lower ranges which are connected with them, occupy the greater part of the Italian peninsula; on each side of which is a strip of lower ground next the sea. The larger rivers of the peninsula are on the western side, and the principal basins are those of the Arno, the Tiber, the Garigliano, and the Volturno.

Northern Italy includes the Sardinian states, Lombardy, Parma, Modena, the Venetian territories, Bologna, Ferrara, and the Romagna. Southern Italy includes Tuscany, the greater part of the Papal States, and the kingdom of Naples. The islands of Sicily and Sardinia, and several minor ones near the coast, belong to Italy. A general view of the surface and geology of Italy is given in the article APENNINES.

The climates of north and south Italy are very different. In the north, frosts and snow are of common occurrence in winter; but, in the south, tender plants thrive in the open air; and even tropical plants, such as the sugar-cane, the cotton-plant, the Indian fig, and the date-palm, come to maturity. The vine grows all over Italy, but the best wines are made in the south. The high Apennine regions however are bleak and cold even in the south, and there is great variety of climate in the peninsula. The staple products of Italy are corn, rice, wine, oil, silk, and fruits of every kind; and the mountains afford summer pasture for the cattle. The system of irrigation prevails in the north, especially in Piedmont and Lombardy, but the southern parts are subject to droughts in summer.

The following table gives the area of the several states of Italy, including the islands of Sicily and Sardinia. The population is mostly that of 1844.

States.	Area in sq. miles.	Population.
Lombardy . . .	8,460	2,600,760
Venice	9,472	2,202,529
Piedmont . . .	20,850	4,125,735
Sardinia . . .	9,200	524,633
Papal States . .	17,100	2,908,115
Naples	32,484	6,382,706
Sicily	10,536	2,040,610
Tuscan States .	9,250	1,786,875
Modena . . .	2,120	515,343
Parma	2,247	496,803
San Marino . .	21	7,600
Total. . .	121,740	23,591,709

There is no other country of Europe which has so many considerable towns in proportion to its extent as Italy. With respect to the character of the inhabitants, it may be remarked that Italy is not one country, inhabited by one people, and looking up to one capital. There are not only many provincial differences, but national differences of character, different institutions and customs, and even different languages. The steady plodding inhabitants of the rich plain of the Po are a very different sort of people from the active, frugal, money-seeking, adventurous, and free-spirited Genoese, or the caustic, refined, but somewhat consequential and verbose Tuscans; while the Tuscan himself is different from the mercurial, fantastical, careless and pleasure-seeking, but quick and acute Neapolitan. Industry has made and is making considerable progress; better modes of agriculture have been adopted, manufactories are established everywhere, new roads and canals have been made, particularly in Lombardy, the Sardinian states, and Tuscany; several railways are in course of being laid, and some of the lines are already opened. The chief towns are all distinguished by architectural embellishments, and are increasing in population. The maritime trade, especially of Genoa, Leghorn, Venice, and Naples, is thriving, though inferior to that of Trieste.

The religion of Italy is the Roman Catholic, with the exception of a few valleys among the Alps of Piedmont, inhabited by the Valdenses, and of the Jews, who live in most of the principal towns, and have synagogues. At Leghorn, Florence, Venice, and other mercantile places, chapels for foreign Protestants and Greeks are tolerated.

Italy has been for ages the seat of the fine arts, and has still many respectable artists, but since the death of Canova has not had a first-rate sculptor or painter. With architects and engineers she is better provided; and engraving is highly cultivated.

History.—The history of ancient Italy, as a whole, is a part of the history of Rome; and the several ancient divisions, such as ETRURIA and others, require separate notices. The history of those nations which preserved their independence for some centuries after the foundation of Rome is sketched in such articles as APULIA, CAMPANIA,

&c.; the period that elapsed after the fall of the Western Empire is noticed under BELISARIUS, LONGOBARDS, THEODORIC, &c.

The modern history of Italy begins properly with the reign of Charlemagne, who was crowned king of the Romans and emperor of the West in the year 800. Under the weak rule of his successors, the counts, marquises, and other great feudatories of the new Western Empire became, in fact, independent, and Italy was parcelled out into numerous principalities or states. As the principal towns rose in population and wealth, they made themselves independent of the feudatories, and formed so many commonwealths. Then arose innumerable quarrels between the towns and the great lords; of the towns among themselves; of the lords with one another; and, last of all, of part of both towns and lords against the kings of Germany, who styled themselves the successors of Charlemagne, and assumed the often merely nominal title of kings of Italy and emperors of the West. In the midst of all this confusion some considerable states were formed, such as the Papal States, the kingdom of Sicily and Apulia under the Normans, the republics of Venice, Florence, and Genoa, and lastly the duchy of Milan. The dukes of Savoy, originally a transalpine dynasty, also acquired large possessions on the south side of the Alps. Such was the origin of the present Italian states, which are treated under distinct heads.

Italian Language and Literature.—The language called Italian is the written language of Italy, and bears the same analogy to the spoken language of Tuscany and Rome as the written languages of France and England bear to the oral language spoken in the towns and provinces of those respective kingdoms in which dialects do not prevail. There are however many Italian dialects, of which the principal are the following:—1. The Milanese is spoken at Milan and its territory, and has been cultivated by Maggi, Parini, Grossi, Porta, and other writers. 2. The Venetian is one of the most graceful of the Italian dialects, and is exemplified in the works of Gritti, Lamberti, Goldoni, Buratti, and others. 3. The Mantuan dialect has been illustrated by the writings of the eccentric wayward monk Folengo. 4. Calvo has written in the Piedmontese, and Alfieri has given a short vocabulary of it, with the corresponding words in Tuscan. 5. Genoese: Foglietta and Cavalli are two of the best writers in this dialect. 6. The Bolognese is one of the most uncouth dialects of Italy, but it has some poets, among others Giulio Cesare Croce. 7. The Neapolitan, or Apulian, is very copious, abounds with diminutives and vituperative terms, and is well suited for broad humour and for the purpose of imitative harmony. The Neapolitan among all the other Italian dialects has been perhaps the most cultivated by writers. There are also the Sicilian, the Calabrian, the Sardinian, and a few others.

The Italian dialects must not be considered as corruptions of the written Italian, but as languages which were anterior to it, and were formed by an admixture of the Latin with words derived from the languages of the various tribes which invaded Italy. From various causes, the Tuscan dialect attained a polish and completeness earlier than the rest, and gradually became the language of literature throughout the greater part of Italy. The writers of the fourteenth century, Dante, Dino Compagni, Petrarca, Boccaccio, Cino da Pistoja, Sacchetti, Villani, Pandolfini, were all Tuscans, and they permanently impressed on the written language of Italy the stamp of the Tuscan spirit and idiom.

The writers of the fourteenth century are called by the Tuscans the 'Trecentisti,' and they are considered by many as the purest models of Italian composition. In the fifteenth century there was a retrograde movement in the cultivation of the Italian language. The discovery of the ancient classics, the revival of the study of the Roman law, the arrival of many learned Greek refugees flying from the Ottoman conqueror, the influence of the Roman hierarchy, whose language was the Latin—all these circumstances gave a general impulse towards classical learning, and the Italian literati disdained to write except in the language of their presumed forefathers. Alberti, Bracciolini, Bruni, Filelfo, Panormita, Platina, Pontano, Valla, Ficino, and other learned men and also women of that age, wrote in Latin. But Lorenzo de' Medici at Florence, the Este at Ferrara, the Gonzaga at Mantua, countenanced Italian poetry, and Pulci, Bello, and Bojardo gave the first specimens of the Italian epic, while Poliziano and Lorenzo de' Medici himself excelled in lyrics.

The sixteenth century was the second æra of Italian literature. It has been styled the age of Leo X. and of the 'Cinquecentisti,' and is characterised by the great names of Macchiavelli, Guicciardini, Ariosto, and Tasso. The other principal writers of the sixteenth century were: the historians and biographers, Varchi, Segni, Bembo, Paruta, Davanzati, Costanzo, Vasari, Cellini; the poets, Sannazaro, Berni, Molza, Trissino, and Guarini; the essayists, Castiglione, Della Casa, Speroni, and Bottero; the critics, Castelvetro and Salviati; the novelists, Bandello, Firenzuola, Grazzini; the architects, Barocci da Vignola, Palladio, and Marchi; and numerous others in almost every branch of learning. Sigonio, Baronius, Panvinio, Vida, the jurists Alciati and Turamini, the mathematicians Maurolico and Cardano, and many other men of science, wrote in Latin.

The seventeenth century, called by the Italians the age of the Scientisti, exhibited a degeneracy of taste, both in literature and the arts, owing principally to the leaden yoke of Spanish domination. However the same causes of mental degradation and corruption did not operate equally over all the peninsula. Tuscany, Venice, Genoa, Piedmont retained their independence, and with it their national spirit. The celebrated Sarpi; the learned prelates Bentivoglio, Pallavicino, and Bellarmino; the historian Davila; the Jesuits Segneri and Bartoli; the poets, Guidi, Chiabrera, Filicaja, Tassoni, Rinuccini, Menzini; the painter and poet Salvator Rosa; the philologist Salvini; the philosophers Cassini, Torricelli, Malpighi, Borelli, Marsigli, Redi, Viviani, and Guglielmini, all wrote in this century.

In the eighteenth century Italian literature assumed a new character. The historians Maffei, Muratori, and Giannone, and the philosophic writers Vico, Stellini, and Genovesi, brought a new light into their respective departments. The spirit of investigation and deep reflection was now busy at work. Goldoni effected a revolution in the Italian stage, and Metastasio imparted a poetical vigour to the operatic drama. In criticism there were Zeno, Baretti, Gozzi, Mazzuchelli, and Cesarotti; Milizia, Lanzi, and Bottari wrote eloquently on the fine arts: Martini and Tartini, on music; Verri, Carli, Galiani, Neri, on political economy; Bettinelli, Tiraboschi, and Corniani, on the history of Italian literature; Buonafede, on the history of philosophy; Beccaria, Filangieri, and Mario Pagano, on legislation; Vallisnieri and Spallanzani, on natural history; Volta and Galvani, on physics; Denina, on the history of Italy; Passeroni, Varano, and Parini wrote moral poetry; and lastly Alfieri created the Italian tragedy.

The invasion of Italy by the French in 1796 and the political revolution which followed, whilst they served to stimulate the minds of the Italians to exertion, had an unfavourable influence upon the language. French was the language of the conquerors, and it became the fashionable language of the conquered. A few writers, formed in a better school, opposed the torrent: among these are Alfieri, Monti, Foscolo, Ippolito Pindemonte, Napione, Cesari, and Giordani. The other principal writers of the present century are—the historian Botta; the tragedians Niccolini and Pellico; the romantic poets Grossi and Sestini; the didactic poet Arici; the satirist D'Elci; the novelist, philosopher, dramatist, and lyric poet Manzoni; the novelist Rosini; and the dramatist Nota. Micali has written the history of Italy before the Roman dominion; Bossi, a general history of Italy; Vacani, the military history of the Italian army employed in Spain under Napoleon; Cuoco and Colletta, the history of Naples; Pignotti, the history of Tuscany; Manno, that of the island of Sardinia; and Serra, the history of Genoa. Cicognara has given a history of sculpture; Ugoni and Lucchesini have written on the Italian literature of the eighteenth century; Gioja has written largely on political economy and legislation; Romagnosi and Tamburini, on jurisprudence; Brocchi and Breislak, on geology and mineralogy.

ITCH, or, as it is termed by nosologists, *Scabies* or *Psora*, is a disease of the skin, of which the most prominent symptom is a constant and intolerable itching. The eruption consists most commonly of minute vesicles filled with a clear watery fluid, and slightly elevated on small pimples. The eruption occurs principally on the hands and wrists, and in those parts most exposed to friction, as the spaces between the fingers and the flexures of the joints. After a time it extends from these parts to the arms, legs, and trunk, but very rarely, if ever, appears on the face.

The itch never appears to arise spontaneously; but, where cleanliness is not strictly observed, it is easily communicated by contact. Minute insects, of a species of Acarus, are often found in the vesicles; but, as they are also often absent, the disease cannot be considered to depend entirely upon their presence.

A certain specific for the cure of the itch, which never gets well without treatment, is the local application of sulphur; all the parts on which the eruption is visible should be plentifully smeared with the *unguentum sulphuris* every night, or every night and morning, till the cure is perfected, which will require from three days to a fortnight, according to the severity and extent of the disease. The ointment must remain on the parts after each application, and occasional warm baths ought to be used during the treatment.

ITHACA. [IONIAN ISLANDS.]

IU'LUS, a genus established by Linnæus for such *Insecta Myriápoda* as now form the order *Chilógnatha* (*χεῖλος, γνάθος*), the first division of *Myriapoda* in the arrangements of Leach and Latreille. The *Chilognatha* have crustaceous and usually cylindrical bodies, formed of numerous unequal segments, very short feet, each terminating in a single hook; a vertical rounded head, furnished with two mandibles, which are either thick and robust, or united with the labium and elongated. They have no palpi. The antennæ are two, very short, either slightly thickened towards their extremities, or filiform throughout, and composed usually of seven, more rarely (as in the genus *Sphæropœus*) of six joints. Their eyes are smooth and vary greatly in number. These animals move slowly and with a gliding motion. When disturbed, they roll themselves up spirally, or into a ball. They feed on decomposing animal and vegetable matter.

The position assigned to the Chilognatha, at the head of the Myriapoda, by Latreille and others has recently been disputed by Professor Brandt and by Mr. Newport.

The chilognathous Myriapoda are found in all parts of the world, certain genera, however, affecting certain geographical divisions. Thus the species of *Glomeris* are European; those of *Sphærostreptus* and *Sphæropœus*, African and Eastern. The genus *Iulus*, in its most limited sense, includes European, Asiatic, and North American species. *Iulus terrestris* is a familiar British example.

A synopsis of the genera of Chilognatha will be found in the third part of the nineteenth volume of the 'Linnæan Transactions,' appended to a valuable memoir on the Myriapoda by Mr. Newport. Professor Brandt's papers on these animals are published in the 'Transactions and Proceedings of the Imperial Academy of St. Petersburg.'

IVAN. [RUSSIA.]

IVES, ST. [CORNWALL; HUNTINGDONSHIRE.]

IVINGHOE. [BUCKINGHAMSHIRE.]

IVIZA. [BALEARIC ISLANDS.]

IVORY, the name given to the substance of the tusks of elephants, is extensively used for the handles of knives and forks, and for making and embellishing numberless small articles in general use. The principal supplies of elephants' teeth to this country are from the west coast of Africa and from Ceylon. The remaining imports are from the coast of Barbary, the Cape of Good Hope, Madagascar, and Siam. The quan-

imported annually is about 5500 cwts., of which about 4500 cwts. are retained for consumption.

IVORY BLACK. [CHARCOAL, ANIMAL.]

IVORY COAST. [GUINEA.]

IVORY, JAMES, a distinguished British mathematician, was born at Dundee, in 1765, and educated at the university of St. Andrew's, where, during four years, he was occupied with the study of mathematics, languages, and philosophy. In 1786 he accepted an appointment as an assistant teacher in an academy then recently established in Dundee, and he continued to fulfil the duties of that post during three years. At the end of that time he engaged with some other persons in the establishment at Douglastown, in Forfarshire, of a factory for spinning flax, and this he appears to have superintended during fifteen years.

In 1804 Mr. Ivory, who then obtained the appointment to a professorship of mathematics in the Royal Military College, quitted Scotland, and went to reside at Marlow, in Buckinghamshire, where that institution had, a few years previously, been formed. On the removal of the college to its present site (Sandhurst in Berkshire), Mr. Ivory accompanied it to the latter place, where he remained till his retirement from public service, having fulfilled the duties of his professorship to the satisfaction of the authorities and the great benefit of the students.

In the beginning of the year 1819, Mr. Ivory, feeling his health decline under the great exertions which he made in carrying on his scientific researches and performing his duties as a professor, was induced to resign the appointment, and to retire, with a pension, into private life. In 1831, in consideration of the great talent displayed in his mathematical researches, he received the Hanoverian Guelphic Order of Knighthood, with an annual pension of 300*l.*, which he enjoyed during the rest of his life; and, in 1839, the University of St. Andrew's conferred on him the degree of doctor in laws. He lived in great privacy in or near London till the time of his death, which happened September 21st, 1842, in the seventy-seventh year of his age.

Mr. Ivory's earliest writings were three Memoirs which he communicated to the Royal Society of Edinburgh. He contributed, between 1809 and 1839, fifteen papers to the 'Transactions of the Royal Society of London,' nearly all of them relating to physical astronomy, and every one containing mathematical investigations of the most refined nature. Several valuable communications from his pen are contained in the 'Philosophical Magazine;' in Maseres's 'Scriptores Logarithmici;' in Leybourn's 'Mathematical Repository;' and in the Supplement to the sixth edition of the 'Encyclopædia Britannica.' Three books on the geometry of planes and solids, in connection with the first six books of Euclid's 'Elements,' were written by him, for the use of the students in the Military College, and published anonymously.

In 1815 Mr. Ivory was elected a fellow of the Royal Society of London; he was also an honorary fellow of the Royal Society of Edinburgh; an honorary member of the Royal Irish Academy, and of the Cambridge Philosophical Society; a corresponding member of the Institute of France, of the Royal Academy of Sciences of Berlin, and of the Royal Soçiety of Göttingen. The Copley medal and two royal medals were the rewards of his scientific communications to the Royal Society.

IVRY. [EURE.]

IVY. [HEDERA.]

IXO'RA, a genus of rubiaceous plants of the tribe *Cinchonaceæ*. The species are numerous, and chiefly confined to India and the Oriental Archipelago. They form shrubs or small trees. The flowers are in terminal corymbs, and are usually red, but sometimes white, and are generally highly ornamental, whence several are cultivated in our hot-houses, where they require to be kept in a moist heat.

J in the English language has a sibilant sound, closely connected with that of the syllable *di* before a vowel. It has a similar, though not the same, sound in the French tongue; but in German it is pronounced like our *y* before a vowel. Though it is generally said that its power with the Romans was the same as with the Germans, there is reason for thinking that our own sound of the letter was not unknown to the ancient inhabitants of Italy. The name of Jupiter was undoubtedly written originally Diupiter, so Janus was at first Dianus, just as the goddess Diana was called by the rustics Jana. [D and I.] The argument might be strengthened by comparing the Latin *jungo* with the Greek ζευγνυμι, Jupiter with Ζευ πατερ, &c., and also by referring to the modern Italian forms, *giogo*, *giovare*, *giovenco*, &c. Two pronunciations may have coexisted in the same country. As to the form of the letter *j*, it was originally identical with that of *i*, and the distinction between them is of recent date.

In the Spanish language *j* represents a guttural, and is now used instead of *x*, which had the same power: thus Jeres rather than Xeres is the name of the town which gives its title to the wine called by us sherry. For the changes which *j* may undergo see D, G, and I.

JA'BIRU, the name of a genus of Grallatorial or Wading Birds, *Mycteria* of Linnæus, and thus characterised:—Bill long, conical, smooth, robust, compressed, and pointed; upper mandible trigonal and straight, the lower thicker and turned up. Head and neck more or less bare of feathers. Anterior toes united at the base by a membrane. Size gigantic. Is found in South America, Western Africa, and Australasia. Habits almost entirely the same with those of the Storks. There are three species known, distributed geographically as above.

JABLONSKI, PAUL ERNEST, the son of Daniel Ernest Jablonski, a minister of the Protestant church, was born at Berlin in 1693. He was educated at the university of Frankfort on the Oder, where he applied himself to the study of the Coptic and other oriental languages. At the age of twenty-one he was sent at the expense of the Prussian government to the various public libraries in Europe, in order to pursue his studies and to make extracts from Coptic MSS. In 1722 he was appointed professor of theology at Frankfort on the Oder, and minister of the Protestant church in the same place. He died Sept. 13, 1757.

Jablonski's works are numerous. Several of them have been republished, with additions and corrections, by Te Water, under the title of 'Opuscula quibus Lingua et Antiquitates Ægyptiorum, difficilia Librorum Sacrorum Loca, et Historicæ Ecclesiasticæ Capita illustrantur, &c., 4 vols. 8vo., Leyden, 1804–13.

JACAR, [Castilla-la-Nueva.]

JACCHUS, or IACCHUS, the name of a genus of monkeys applied by Geoffroy, Desmarest, and others to the form denominated *Hapale* by Illiger, *Ouistitis* of the French, the type of which may be considered to be *Simia Jacchus* of Linnæus.

Upper intermediate incisors larger than the lateral ones, which are isolated on each side; lower incisors elongated, narrow, and vertical, the lateral ones longest; upper canine teeth conical and of moderate size; two lower ones very small.

$$\text{Incisors, } \frac{4}{4}\text{; canines, } \frac{1-1}{1-1}\text{; molars, } \frac{6-6}{6-6} = 36.$$

Size small, muzzle short, facial angle about 50°. Head round, prominent at the occiput; the five fingers armed with claws, with the exception of the thumbs of the posterior extremities, which are furnished with nails; thumb of the anterior extremities in the same direction as the fingers; fur very soft; tail full and handsome. A native of South America.

The species are all of diminutive size, rather numerous, and are generally known by the name of *Marmosets*. Habits squirrel-like. The food consists of fruits, roots, seeds, insects, eggs, small birds, and nestlings.

JACKAL, or TSCHAKKAL, the name of a section of *Carnivora*, placed by most naturalists within the pale of the genus *Canis*, and of which the Common Jackal is an example. This animal is the *Chacal* or *Loup doré* of the French; *Adive* of Buffon; *Canis aureus*, Linn.

Description.—Yellowish gray above, whitish below; thighs and legs yellow; ears ruddy; muzzle very pointed; tail reaching hardly to the heel

Jackal (*Canis aureus*).

(properly so called). The colours sometimes vary, and the back and sides are described by Mr. Bennett as of mixed gray and black, and as abruptly and strikingly distinguished from the deep and uniform tawny of the shoulders, haunches, and legs. The head nearly of the same mixed shade with the upper surface of the body. Odour offensive.

Geographical Distribution.—India, other parts of Asia, and Africa. Cuvier says that Jackals are met with from India and the environs of the Caspian Sea to Guinea, but that it is not certain that they are all of the same species.

Habits nocturnal and gregarious, hunting in packs, and the pests of the countries where they are found, and where they burrow in the earth. In their huntings the Jackals will frequently attack the larger quadrupeds, but the smaller animals and poultry are their most frequent prey. Their cry is very peculiar and piercing. Captain Beechey notices it as having something rather appalling when heard for the first time at night; and he remarks that, as they usually come in packs, the first shriek which is uttered is always the signal for a general chorus. 'We hardly know,' continues the Captain, 'a sound which partakes less of harmony than that which is at present in question; and indeed the sudden burst of the answering long-protracted scream, succeeding immediately to the opening note, is scarcely less impressive than the roll of the thunder-clap immediately after a flash of lightning. The effect of this music is very much increased when the first note is heard in the distance (a circumstance which often occurs), and the answering yell bursts out from several points at once, within a few yards or feet of the place where the auditors are sleeping.' These animals are said to devour the dead on the battle-field and to scratch away the earth from the shallow graves in order to feed on the corpses.

The story of the Jackal being the lion's provider may have arisen from the notion that the yell of the pack gives notice to the lion that prey is on foot, or from the Jackal's being seen to feed on the remnants of the lion's quarry.

JACKDAW. [CORVIDÆ.]

JACKSON, WILLIAM, was born in 1730, at Exeter, of which place his father was a respectable tradesman. He was placed under tuition of the organist of the cathedral, and completed his studies in London, under the celebrated Travers, of the Chapel-Royal. He returned to and settled in his native city, and in 1777 was appointed subchanter, organist, lay-vicar, and master of the choristers of the cathedral.

Jackson first made himself known as a composer by the publication of 'Twelve Songs,' which immediately spread his fame throughout the kingdom. His reputation was maintained by many other works. His 'Twelve Canzonets for Two Voices' were once the delight of every musical circle. Of these, 'Time has not thinned my flowing Hair,' and 'Love in thine Eyes for ever plays,' have lost none of their charms. Of three dramatic compositions, 'The Lord of the Manor' alone survives.

Jackson had merit also as an author, and was no mean proficient in the sister art of painting: he chiefly employed his pencil in landscapes. He died in 1803, leaving a widow, two sons, and a daughter.

JACKSON, ANDREW, late President of the United States of North America, was descended from a Scottish family, which had settled in Ireland, whence his father, Andrew Jackson, with a wife and two sons, emigrated in 1765 to South Carolina, where his third and youngest son, Andrew, was born, March 15, 1767. The father died soon afterwards.

Andrew appears to have been his mother's favourite; and his original destination was to be a clergyman. With this view, he studied theology for some years; but when the War of Independence commenced the young Jacksons did not hold back. Andrew is recorded to have fought when little more than thirteen. And from this time he is stated to have taken a part in the campaigns as long as the war lasted. In 1784 he placed himself under an advocate to be instructed in the law. This new study he prosecuted with so much success, that in 1787 he was appointed solicitor for what was then called the Western District of North Carolina, and is now the State of Tennessee; but he did not entirely throw off his military character, and he served with distinction, though only as a private, against the Indians, who had become troublesome to the state.

Having acted as one of the members of the Convention for establishing a constitution for the state of Tennessee, he was, in 1796, elected to a seat in the House of Representatives. The next year he was chosen a Senator, but resigned his seat after holding it for one session, and was appointed by the legislature of Tennessee a Judge of the Supreme Court in that state, having also been shortly before appointed a Major General of the state forces. But he resigned his judicial office, and lived in retirement on a farm, a few miles from Nashville, on the Cumberland River, till the breaking out of the war with England in 1812.

His first command was that of a body of between two and three thousand volunteers, with whom he was directed to proceed down the Mississippi for the defence of the lower country. This was in November 1812. The next year he greatly distinguished himself by a campaign against the Creek tribes.

In 1814 Jackson was appointed a Major General in the service of the United States, and succeeded in taking Pensacola on November 7, and raised himself to the highest point of reputation and popularity among his countrymen by the famous repulse of the British forces in their attack on New Orleans, Jan. 8, 1815. The next military command which he held was in the war against the Seminole Indians of Florida in 1818.

General Jackson was commissioner on the part of the United States in the negotiation with Spain for the transference of Florida; and after the arrangement he was, in 1821, appointed the first governor of the province. He held this post for a year, and was then again elected a member of the Senate for the state of Tennessee.

When the election of a new president came on at the end of 1824, General Jackson was a candidate along with Mr. Adams, Mr. Clay, and Mr. Crawford. Mr. Adams became president on this occasion, but General Jackson was elected in 1828, and again in 1832; so that he was at the head of the government of his native country for the eight years from 1829 to 1837.

General Jackson survived his presidency about eight years, and died at his seat called the Hermitage, near Nashville, in Tennessee, June 8, 1845. He was married, but had no issue.

JACKSON, JOHN, R.A., was born in 1778, at Lastingham, in Yorkshire, and was apprenticed to a tailor; but, Lord Mulgrave and Sir George Beaumont having seen his imitation of a picture by Reynolds, and some other proofs of his talent, they encouraged him, purchased the unexpired term of his apprenticeship, and sent him to London in 1794 to study in the Royal Academy. Sir G. Beaumont also gave him an allowance of 50*l.* per annum, and an apartment in his house in town.

Jackson first attracted notice as a portrait painter in oil about 1806, and in 1817, when he was elected a member of the Royal Academy, his reputation was little inferior to that of Lawrence. In the summer of 1819 he visited Rome in company with Chantrey, and painted for him there a portrait of Canova. Between 1804 and 1830 Jackson exhibited at the Royal Academy 145 pictures, but must have painted many more, as he was very rapid, and during the latter part of his life constantly employed. His best works are the portraits of Lady Dover, of Flaxman, and of himself, both painted for Lord Dover, and the portrait already mentioned of Canova. Jackson died June 1, 1831.

JACKSON, PORT. [SYDNEY.]

JA'COBI, FRIEDRICH HEINRICH, was born at Düsseldorf, in 1743, and died at Munich, 10th March, 1819. He was distinguished, not so much as the author of a peculiar system of philosophy, as for the critical acumen and forcible eloquence with which he detected and exposed the incoherences and defects of the prevailing systems. His earliest publication was a philosophical poem, entitled 'Friendship and Love,' which first appeared in 1777, afterwards republished under the simpler title of 'Woldemar.' In this year Jacobi was invited to Munich, and appointed geheimrath, in which situation he exposed the injurious tendency of the Bavarian system of finance. In 1781 he commenced an able controversy with Mendelssohn, in his work 'On the Doctrine of Spinosa,' which he further prosecuted in his 'Observations on Mendelssohn's Apology for the Doctrine of Spinosa.' By the essay, entitled 'David Hume, or Idealism and Realism,' he provoked the hostility of the followers of Kant, and that of the admirers of Fichte by his 'Sendschreiben an Fichte.' When the troubles arising out of the French Revolution extended to Germany, Jacobi retired to Holstein, whence he removed successively to Wandsbeck and Hamburg; from the latter he was called, in 1804, to Munich, to assist in the formation of the new Academy of Sciences, of which he was appointed president in 1807. This dignity Jacobi resigned in 1813, upon attaining his 70th year. Shortly previously his work 'On Divine Things and on Revelation' (Leipz., 1811), had involved him in a bitter controversy with Schelling. Jacobi's complete works have been published in 6 vols., Leipzig, 1812–24.

JACOBINS is the name of a faction which exercised a great influence on the events of the French Revolution. This faction originated in a political club formed at Versailles, about the time of the meeting of the first National Assembly, and which was composed chiefly of deputies from Brittany, who were most determined against the court and the old monarchy, and some also from the south of France, among whom was Mirabeau. When the National Assembly removed its sittings to Paris (October 19, 1789), the Breton club followed it, and soon after established their meetings in the lately suppressed convent of the Jacobins, or Dominican monks, in the Rue St. Honoré. From this circumstance the club and the powerful party which grew from it assumed the name of Jacobins. During the year 1790 the club increased its numbers, and obtained such influence and power, especially in 1792, as to control the legislature. The attack on the Tuileries in August 1792, the massacres of the following September, the suppression of royalty, and most of the measures of the reign of terror, originated with the club of the Jacobins. After the fall of Robespierre in July 1794, the Convention passed a resolution which forbade all popular assemblies to interfere with the deliberations of the legislature, and the club was finally suppressed in 1794.

JACOBITES. [EUTYCHIANS; STUART FAMILY.]

JACQUARD, JOSEPH-MARIE, was born at Lyon, on July 7, 1752, of humble parents, both of whom were employed in operations connected with weaving. His parents died, leaving him a small property, which he employed in the attempt to establish a business in the weaving of figured fabrics. The undertaking failed, and he was compelled to sell his looms in order to pay his debts. He subsequently married, and occupied himself with ingenious schemes for improvements in weaving, cutlery, and type-founding, which produced nothing for the support of his family. In 1792 he assisted in the defence of Lyon against the army of the Convention. Being denounced after the reduction of Lyon, he was compelled to fly. When he was enabled to return, and Lyon began to rise from its ruins, Jacquard applied himself with renewed energy to the perfection of the beautiful apparatus for figure weaving which bears his name. [WEAVING.] He had conceived the idea of such an apparatus as early as 1790, and he now succeeded, though but imperfectly, in accomplishing his end. His machine was presented, in September 1801, to the national exposition of the products of industry, the jury of which awarded him a bronze medal for its invention. In the same year he obtained a patent, or 'brevet d'invention,' for the term of ten years.

About this time the attention of Jacquard was

accidentally directed to the construction of a machine for weaving nets for fishing and maritime purposes. He accomplished the desired object, but, having amused himself and his friends with his contrivance, he threw it aside. His machine-made net however fell into the hands of the préfet at Lyon, and the result was that, according to the arbitrary fashion of the time, he and his machine were placed under arrest and conveyed to Paris, where the invention was submitted to inspectors, amongst whom were Napoleon and Carnot, and a gold medal was awarded to him in February 1804.

In 1804 Jacquard returned to Lyon, where he was long engaged in superintending the introduction of his inventions for figured weaving and for making nets, in which he was powerfully aided by Camille Pernon, a rich manufacturer. For some years Jacquard had to struggle against much opposition and prejudice on the part of the Lyonese weavers, who conspired to discourage the use of his machinery, and his personal safety was at times endangered. At length however the value of the invention was acknowledged, and it was brought very extensively into use, not only in France, but in Switzerland, Germany, Italy, and America.

Jacquard continued to reside at Lyon, where he exerted himself in promoting the use of his great invention until, having lost his wife, he retired to Oullins, a village near Lyon, where he spent his latter years in retirement, and died August 7, 1834. During his life he received the cross of the Legion of Honour, and in 1840 a public statue was raised to his memory at Lyon. His 'Eloge Historique' has been published by M. de Fortis.

JADE. [Nephrite; Saussurite.]

JAEN, an administrative division of the province of Andalucia, in Spain, which consists of the upper part of the basin of the Guadalquivir, and lies between the Sierra Morena on the north, which divides it from Castile, the Sierra Nevada on the south towards Granada, and the Sierra de Cazorla on the borders of Murcia. To the west the ground slopes with the course of the Guadalquivir towards Cordova. Numerous offsets of the above chains cross the territory of Jaen. The area is 4427 square miles, and the population 276,919. The soil in the valleys is extremely fertile. The produce is wine, oil, corn, honey, silk, vegetables, and fruits of every kind. The mountains abound with rich pastures; sheep and a fine breed of horses are bred in the country. *Jaen*, the capital of the province, is an episcopal town, and has a fine cathedral and 19,000 inhabitants. [Andalucia.]

JAFFA. [Syria.]

JAFNA, a town situated on the peninsula of Jafnapatam, at the northern extremity of the island of Ceylon, is defended by a fort, regularly formed with five bastions, a broad moat, and a glacis. The town is about half a mile E. from the fort. The streets are regular, the houses neat and clean, and the population about 5000. Jafna has communication with the sea by a river. Ships unload in the roadstead, and the cargoes are conveyed to the town by boats.

JAGUAR. [Leopards.]

JAINAS, or JAINS, a religious sect of the Hindoos. They are most numerous in the southern and western provinces of Hindustan, where they are principally engaged in commerce, and from their wealth and influence form a very important division of the population of the country. The history and opinions of this sect are also interesting from their striking similarity to the chief peculiarities of the religion of Buddha. They are divided into two sects, which have a great dislike to each other. They have many temples in Hindustan, one of which Bishop Heber was permitted to inspect. ('Journey to the Upper Provinces of India,' vol. i. p. 385.) The most complete account of the Jains is given by Professor Wilson, in his 'Sketch of the Religious Sects of the Hindoos.' ('Asiatic Researches,' vol. xvii.)

JALAP. [Convolvulus Jalappa.]

JALOOFS. [Senegambia.]

JAMAICA, one of the Greater Antilles, and the most important possession of the British in the West Indies, extends from 76° 15′ to 78° 25′ W. long., and from 17° 40′ to 18° 30′ N. lat. Its length from E. to W. is nearly 150 miles, and its width may on an average be 40 miles. The area is about 4256 square miles. The population in 1844 was 377,433, of whom 181,633 were males, and 195,800 were females. Of this population, 15,776 were white, 68,529 coloured, and 293,128 black.

The surface of this island is very uneven. The eastern part is almost entirely filled up by the Blue Mountains, whose principal ridge occupies the middle of it, and runs nearly east and west. This range varies from 5000 to 6000 feet in elevation; and it has numerous offsets on each side. The western boundary of this mountain-region is formed by a ridge, which runs across the whole island from south-east to north-west, and rises in some places to a height of 4500 feet. The greatest plain in the island is that of Liguanea, which begins a few miles east of Kingston, and extends westward to a distance of about 30 miles: its average breadth is about 5 miles. Another level spot is the Plain of Vere, separated from the former by a low range of hills; and minor ranges exist in other parts of the island, which inclose numerous valleys.

Near the central line of the island, the hills present the characteristics of the limestone formation, of which they consist. Caverns occur in several places, and some of them are very extensive. The water which runs down from the hills forms small rivers, which flow for a short distance and then disappear in holes, and sometimes come again to the surface and again sink. These districts are only provided with running water during the rains, and the inhabitants are obliged to have recourse to tanks or cisterns, in which they collect the rain-water for the dry seasons. In other districts, Jamaica has the advantage of being well watered by numerous rivers, rivulets, and springs. None of the rivers are navigable, except the Black River; but as Jamaica contains 500 miles of sea coast, and nearly 100 harbours, bays, creeks, and coves, the want of river navigation is not much felt.

The climate of Jamaica is considered exceedingly hot; but this is only the case in the lower plains along the southern coast. Snow has never been observed, even on the most elevated peaks; hail is not a rare occurrence on them, but it melts as soon as it reaches the ground. There are two rainy and two dry seasons. The rains last from about May to July or August, and during October and November. The dry seasons occur between these periods. The July rains are most copious and long-continued, and are accompanied by excessive heat. In the autumn, between the two rainy seasons, hurricanes frequently occur.

The staple articles of the island are sugar, rum, and molasses, which form by far the most important articles of export. The sugar plantations are very numerous and extensive, especially in the lower and warmer tracts of the island. On the hills and their declivities coffee is cultivated to a great extent. Next to these the pimento plantations supply the most important article of export. Arrowroot, indigo, which formerly was much more cultivated than at present, ginger, turmeric, and cacao are also cultivated, as also a little tobacco. Indian corn is universally cultivated, and yields an abundant produce; two and even three crops of it can be raised within the year. Guinea-corn is cultivated, as are also yams, cassava, sweet potatoes, a few grasses, and a great variety of delicious fruits. The forests contain mahogany, satinwood, cedar, fustic, logwood, bamboo, cocoa, and various other trees.

The horned cattle are very numerous. The horses are of a middle size, hardy and active, but only fitted for the saddle and harness. Mules are numerous, and employed on the sugar estates. Sheep, goats, and hogs abound. All kinds of poultry are raised in the greatest abundance, excepting geese and ducks.

Jamaica is politically divided into three counties, Surrey, Middlesex, and Cornwall; it contains one city, Kingston, and 33 towns and villages. The counties are subdivided into 21 parishes.

1. The county of Surrey extends over the eastern portion of the island, and contains Port Antonio, Morant Bay, and the harbour of Kingston. *Kingston* is a considerable city and a place of great trade. It is regularly built, and contains many good houses, churches, charitable institutions, and schools. The harbour is protected by the narrow slip of land on whose western extremity Port Royal is built. The greatest part of the produce of the southern districts is sent to Kingston, and hence exported to Europe or America. The population is about 35,000. A railway from Kingston to Spanish Town was completed and opened in 1846. *Port Royal*, once the capital of the island, has been repeatedly destroyed by earthquakes, hurricanes, and fire, but is still a considerable place, as its harbour is the station for the ships of war, and it contains the naval arsenal and good fortifications. The bulk of its inhabitants are people of colour. Morant Bay, between Port Royal and Morant Point, carries on a considerable trade and is a thriving place. Antonio has a good harbour, but little trade.

2. The county of Middlesex occupies the central part of the island. On its southern coast are Port Henderson and Old Harbour; but they are only visited by small vessels, which carry the produce of the country to Kingston. On the northern shores are Annotto Bay, Maria, and St. Ann's Bay, which carry on some commerce by sea. On St. Catherine's plain is built the town of S. Jago de la Vega, commonly called *Spanish Town*, which is considered the capital of the island, being the seat of government. It contains the governor's residence, the public offices, the superior law courts, and many institutions. The population is about 6000.

3. The county of Cornwall extends over the western part of the island. The two most frequented harbours on the southern shores, Black River and Savanna la Mar, have little trade; but on the northern coast are three thriving towns, *S. Lucia*, *Montego Bay*, and *Falmouth*, each of which contains a population of from 5000 to 8000.

Of the inhabitants of Jamaica, the Maroons were originally runaway slaves, partly from Jamaica itself, partly from Cuba, who lived in the forests on the northern side of the island. In 1738 a tract of land was granted to them in those parts, which they cultivated, and on which they built two small towns; and, though a portion of them forfeited their privileges by a rebellion, others have preserved them to this day. No traces of the native population of the island existed when it was taken by the English from the Spaniards.

Jamaica was discovered by Christopher Columbus on his second voyage, the 3rd of May, 1494, but was not settled by the Spaniards before 1510. In 1655 it was taken from the Spaniards by the English, who for some time did not appreciate its value. Since 1655 it has remained in the undisputed possession of the British, and its internal peace has only been disturbed by the rebellion of the Maroons in 1795. The executive is in the hands of the governor, who, as well as the council, consisting of 12 persons, is appointed by the crown. The governor has the chief civil and military authority. The council constitutes the Upper House. The Lower House, or the Assembly, is composed of 45 members, chosen by the freeholders, two from each of the 21 parishes. Spanish Town, Kingston, and Port Royal, send one member each.

There is a bishop of Jamaica whose see comprises the Bahamas and Honduras. Besides the clergy of the Established Church, who have the care of the several parishes, there are Scotch, Presbyterian, Wesleyan, Baptist, and Moravian ministers.

JAMES, SAINT, THE EPISTLE OF, one of the books of the New Testament. There are at least two individuals of the name of James mentioned in the New Testament.

1. *James*, one of the Apostles, son of Zebedee, and brother of the Apostle John, who was chosen with Peter and John to accompany Christ to the Mount of Transfiguration. He was beheaded at Jerusalem by order of Herod Agrippa, about A.D. 44. He could not have been the author of the epistle, since it bears marks of having been written at a later period.

2. *James* 'the Less' as he is called in Mark xv. 40, the son of Alphæus and Mary, was also one of the Apostles.

There is also mentioned in the New Testament a James, a brother of Jesus (Matt. xiii. 55; Mark vi. 3), who is generally admitted to be the same person as James the Less, for the Greek word translated 'brother' was often used in the sense of 'cousin.' The epistle is almost universally attributed to this James by the Fathers and modern critics; it was probably written shortly before he was put to death by Ananias the high priest, about A.D. 62 or 63.

JAMES I., King of Scotland, was a younger son of King Robert III. His elder brother, David, having been made away with, it is said, by the Duke of Albany, the king caused James to be sent secretly to France, to preserve him from a similar fate. The vessel was taken by an English ship of war, and the prince carried prisoner to London. His father was so affected by the news, that he died of a broken heart. The duke of Albany was thereupon made Regent of the kingdom. James, now in the 13th year of his age, was on April 14, 1405, conducted to the Tower, and he afterwards resided in Nottingham Castle and in Windsor Castle. Henry IV. caused him to be well educated, and in 1417 Henry V. took him with him on his second expedition to France. The Duke of Albany died in 1419, and from that time measures began to be taken seriously for his release. He ascended the throne in 1424, and immediately took active measures to restore the kingdom to order, by putting a check to the ambition of the Albany family and its adherents. He also took very wise measures for the government of the country, and ordered the statutes of parliament, for the first time, to be regularly enrolled. At a later period of his reign James evinced great energy and promptitude in suppressing the disturbances in the Highlands and Isles. The rebels made an unconditional surrender, and the Lord of the Isles was obliged to make his submission on his bended knees at the court of Holyrood House.

The king's vigour and determination were not a little obnoxious to the nobles, who formed a conspiracy against him, under the Duke of Athol, the king's uncle, and on February 21, 1437, the king was murdered, in the 44th year of his age.

James was also distinguished for his literary and poetic talents: three pieces of his have come down to us, 'Christ's Kirk on the Green,' 'The Kings Quhair' (or book), and 'Peebles at the Play,' all displaying considerable intellectual power, and much humour.

JAMES II., King of Scotland, only son of James I., succeeded to the crown when about seven years old. The turbulence of the nobles, to which his father fell a sacrifice, continued undiminished throughout the reign of James II. He was little more than a tool in the hands of a faction. To add to the calamities which the nation suffered, the country was visited by a plague, which was succeeded by a famine. The king was also attacked from England, and at the siege of Roxburgh, which was occupied by the English, he was killed by the bursting of a cannon. This was in the year 1460, and in the 29th year of his age.

JAMES III., King of Scotland, was, like his father James II, about seven years old at his accession to the throne, August 3, 1460. He had to contend at the beginning of his reign with the Lord of the Isles, who allied himself with Edward IV. of England for the conquest of the kingdom. While this rebellion was going on in the north, the minor offices of magistrates and common-councilmen in the several burghs were objects of tumultuous contest; and the act 1469, c. 29, was passed, which was the foundation of the *close system*, that existed till the Burgh Reform Act for Scotland. The king appears to have been the slave of his ecclesiastics, and attached to low favourites, who involved him in a quarrel with his son and his nobles, which ended in the encounter at Bannockburn. The king fled from the field, and falling from his horse was, it is stated, killed, and his body carried off, nobody knew where. (Pitscottie, 220.) This happened in June, 1488, in the 35th year of his age.

JAMES IV., King of Scotland, son of James III., was about fifteen years old at his accession to the throne, June 11, 1488. He was of an active disposition, and the commerce and literature of the country flourished under his encouragement. But he became melancholy and superstitious, and in 1494, by the direction of the Pope's legate, bound about his waist an iron belt, to be worn day and night, for the remainder of his life, as a penance for his participation in the rebellion against his father. In 1512 a great council of the clergy was held at Edinburgh, where the famous *Valor Beneficiorum*, called 'Bagimont's Roll,' was made up. The following year, the king, taking up the French cause, entered, with the flower of the kingdom, on the fatal field of Flodden, where he was slain.

JAMES V., King of Scotland, son of James IV., was little more than a year old when the crown devolved upon him, in 1513. The regency of the young king was long an object of ambition. The slaughter of so many noblemen at Flodden had however given a decided advantage to the clergy. Gavin Dunbar, who had been the king's preceptor, was made archbishop of Glasgow in 1524; in 1528 he was appointed lord chancellor; and in four years afterwards the Court of Session was erected—a court of general and supreme jurisdiction under the chancellor. When Cardinal Beaton succeeded to that office, his vast powers were exercised with such force as to threaten the extermination of every power in the kingdom but his own and the papal. Much discontent was hence created, and in the course of a war, which ensued with the English, the Scottish barons and their troops refused to obey the orders of the king, and attack the retreating English, but, on the contrary, 10,000 men surrendered without a blow. These vexations had such an effect on James, that he died in the 33rd year of his age, in Dec. 1542, leaving a daughter, the unfortunate Mary Stuart, only a few days old. James patronised literature and architecture, and is said to be the author of one or two songs yet popular in Scotland.

JAMES I. of England, and VI. of Scotland, the only offspring of Mary, queen of Scots, by her second husband Henry Stuart, lord Darnley, was born in the castle of Edinburgh, 19th June, 1566. The murder of Darnley took place Feb. 18, 1567, and was followed by Mary's marriage with Bothwell, and her forced resignation of the crown in favour of her son, who was crowned at Stirling on the 29th of June, 1567, as James VI., being then little more than a year old.

Before his mother's marriage with Bothwell he had been committed by her to the care of the Earl of Mar, who had retired with his charge to Stirling Castle. Here he continued to reside during the regencies of the Earl of Murray, of the Earl of Lennox, of the Earl of Mar, and of the Earl of Morton. Morton was compelled to resign the regency at Edinburgh, March 10, 1578. Affairs were now nominally administered by the king, assisted by a council composed of twelve of the nobility. The new government however soon became unpopular, and Morton contrived to regain his former power. In the midst of his success, however, Morton was accused by the king's favourite, Esmé Stuart, brother of the Earl of Lennox, and Captain James Stuart, afterwards created Earl of Arran, of having been accessary to the murder of Darnley. The earl was immediately committed to prison, and was executed at Edinburgh, June 2, 1581. The two favourites were now the rulers of the kingdom. In August 1582 occurred the Raid of Ruthven, the immediate consequences of which were the expulsion of the favourites, and the restraint, amounting to imprisonment, of the king, by the faction headed by the Earls of Mar, Gowrie, and Glencairn, Lord Lindsay, and others, for about ten months. At last, June 27, 1583, having been permitted to go from Falkland to St. Andrew's, he contrived, with the assistance of some friends, to throw himself into the castle there, and to maintain his position till his enemies gave up the contest. One of the king's first acts after he recovered his liberty was to release Arran, and again to commit to him the management of affairs. Though James had visited Gowrie and granted him a pardon, yet he now caused him to be executed. On the 29th July, 1585, a treaty of intimate alliance was concluded between Queen Elizabeth and the Scottish king, and an annual pension of 5000*l.* was settled by the queen upon James. Through the instrumentality of a new court favourite, the eldest son of Lord Gray, Elizabeth now sought to overthrow Arran. With her connivance, the lords who had been banished on account of the Raid of Ruthven entered Scotland at the head of a force of 10,000 men, in the end of October 1585. Arran and his late associates were all dismissed from power, he himself being besides stripped of his titles and estates. The new settlement of the government was followed by the conclusion, July 8, 1586, of another treaty offensive and defensive with England.

In October of the same year, the unfortunate Mary, after her imprisonment of nearly twenty years, was at last brought to trial, and on the 8th of February following she was put to death. Between her condemnation and her execution, James had made considerable exertions to save her, but was very soon pacified, and continued on the same terms of friendship with Elizabeth as before. Gray however, who had betrayed James's interest at the English court, where he had been sent to negotiate on behalf of Mary, was disgraced and dismissed.

In 1589 James was married to the Princess Anne, the second daughter of Frederick II., king of Denmark. He proceeded in person to Upslo in Norway, and did not return to Scotland till May 20, 1590. The first memorable event that occurred in Scotland after the king's return was a daring attempt made by his relation, Francis Stuart, lately created Earl of Bothwell, a grandson of James V. by his son John, prior of Coldingham. He collected a force of his retainers, and on the night of Dec. 27, 1591, entered Holyrood House, set fire to several of the apartments and had nearly made his way to where the king was; he failed, but succeeded in making his escape, and fled to the north. Bothwell and all his adherents were soon after attainted in parliament. In the beginning of 1593, a new conspiracy of Huntly and the other heads of the popish faction was detected; and a few months later, Bothwell, after having failed in another attempt to seize the royal person at Falkland, suddenly returned from England, where he had been protected by Elizabeth, and on July 24, 1593, entered the palace with a band of armed followers, and made the king his prisoner. James was obliged both to grant a full pardon to the traitor and to dismiss the Chancellor Maitland and his other chief ministers; and he remained in durance till the beginning of September. Disturbances however were again and again excited in the course of this and the two following years by the attempts both of Bothwell and the popish lords; and at length these two factions, joining their forces, under the conduct of the Earls of Huntly and Errol, encountered the royal army, commanded by the Earl of Argyle, at Glenlivat in Aberdeenshire, October 3, 1594, and put it completely to the rout. But, in consequence of an expedition conducted into the northern districts by James in person, the popish lords were forced to make their submission, and were allowed to retire beyond seas. Bothwell fled to France, and afterwards withdrew to Spain and to Italy, where he professed himself a convert to popery, and spent the rest of his days in obscurity and indigence.

These commotions had scarcely been quieted when James became involved in new troubles in consequence of a contest with the clergy of the Presbyterian church, which had been established as the national form of religion by an act of the Scottish parliament in 1592. By an unusual exertion of vigour and firmness James was enabled to crush the insurrection, and to turn the occasion to account in bringing the Church into full subjection to the civil authority. In the course of the following year, 1598, the substance of episcopacy, in a political sense, was restored by seats in parliament being given to about fifty ecclesiastics on the royal nomination. Even the

General Assembly was gained over to acquiesce in this great constitutional change.

The most memorable event in the remainder of James's Scottish reign was the very mysterious affair known in history by the name of the Gowrie conspiracy, which was an attempt made to seize the king, by Alexander Ruthven, a younger son of the Earl of Gowrie, who was executed in 1584.

James at length became king of England by the death of Elizabeth, March 24, 1603. The conspiracy of Sir Walter Raleigh, Lord Cobham, and others, to place on the throne the Lady Arabella Stuart, James's cousin, was the first affair of interest. The next was the settlement of the disputes between the Church and the Puritans. James's first parliament met on March 19, 1604. In his speech to the house he zealously urged the union of England and Scotland into one kingdom; but nothing came of this proposal for the present. James however, of his own authority, now assumed on his coins and in his proclamations the title of King of Great Britain.

Peace with Spain was concluded August 18, 1604. The great event of the year 1605 was the Gunpowder Plot. [FAWKES, GUIDO.] In 1612, the death of James's eldest son, Henry, prince of Wales, in the nineteenth year of his age, spread a general grief through the nation.

The death of Prince Henry was followed, Feb. 14, 1613, by the marriage of James's daughter, the Princess Elizabeth, with Frederick the Elector Palatine. James caused great discontent in the country by the favourites whom he successively encouraged. Of these the chief were Carr, or Ker, earl of Somerset, who married the Countess of Essex, and, together with her, was convicted of the murder of Sir T. Overbury; and George Villiers, who, after having been knighted, was created successively earl of Buckingham, marquis of Buckingham, and duke of Buckingham, and who continued to be the first favourite and ruling minister during the remainder of the reign. [BUCKINGHAM.]

In the summer of 1617 James paid a visit to Scotland, and, having summoned a parliament, succeeded in obtaining the assent of that body, and also of the General Assembly, to such regulations as brought the Scottish church very nearly to the model of the English.

The year 1618 was disgraced by the execution of Sir Walter Raleigh. The public indignation at James's subserviency to the court of Spain was roused to a high pitch by the events of the two following years. Austria, assisted by Spain, attacked the Bohemians, who had chosen the Elector Palatine for their king, and James refused to take part with his son-in-law and the Protestant interest on the Continent, and even refused to acknowledge his new regal title. The consequence was that the Elector was obliged to fly into Holland. In the parliament which was called in 1621 after an interval of six years, memorable among other things for the impeachment of Bacon [BACON, FRANCIS], the first decided stand was taken by the Commons in their contest with the crown by their famous protest, passed Dec. 18, 1621, in reply to the king's assertion that their privileges were derived from the grace and concession of his ancestors and himself,—'That the liberties, franchises, and jurisdiction of parliament are the ancient and undoubted birthright and inheritance of the subjects of England.' This resolution, which the king tore from the Journals with his own hand, was followed by the immediate prorogation and soon after by the dissolution of the parliament, several of the leading members of the House of Commons being at the same time sent to the Tower or to other prisons. As the public clamour for the recovery of the Palatinate still continued, another parliament was assembled in February 1624, which eagerly granted supplies for the attainment of that object by force of arms; war was in consequence declared against Spain, and an army under Count Mansfeldt was sent into Germany in the latter part of the year. But this expedition turned out an utter failure.

James's reign of nearly fifty-eight years in Scotland, and rather more than twenty-two in England, was terminated by his death on March 27, 1625.

James's children by his queen, Anne of Denmark, born 12th December, 1574, married 24th November, 1589, died 2nd March, 1619, were:—1. Henry Frederick, born at Stirling Castle, 19th February, 1594, died 6th November, 1612; 2. Robert, died in infancy in Scotland; 3. Charles, who succeeded his father as king; 4. Elizabeth, born 19th August, 1596, married to Frederick V., Elector Palatine, 14th February, 1613, died 8th February, 1662; and three daughters who died in infancy.

James I. was a voluminous author; his works have been partially enumerated by Harris, in his 'Historical and Critical Life,' and by Horace Walpole, in his 'Royal and Noble Authors;' but the fullest account that we have met with is that given by Dr. David Irving, in his 'Lives of the Scottish Poets,' 2nd edition, 2 vols., Edinb. 1810, vol. ii. pp. 207–291. A collected edition of his works was published in folio, in 1616, by James Montague, bishop of Winchester. It ought also not to be forgotten, that the authorised translation of the Bible was commenced and completed under his auspices.

JAMES II. of England, and VII. of Scotland, was the second surviving son of Charles I. by his queen, Henrietta Maria of France, and was born October 15, 1633. He was immediately declared duke of York. After the surrender of Oxford to Fairfax, in June 1646, the duke, his younger brother Henry, and his sister Elizabeth, were committed by parliament to the care of the Earl of Northumberland. They continued under his care till April 21, 1648, when the duke made his escape from St. James's Palace, and took refuge in Holland with his sister Mary, princess of Orange. After various adventures and changes of locality, he settled at Paris; and here he chiefly resided till he attained his twentieth year, when he received a command in the French army, and served under Marshal Turenne. The peace concluded with Cromwell however, in October 1655, compelled him, with his elder brother, to quit France; upon which he retired to the Low Countries, and

entered the Spanish service under Don John of Austria.

At the Restoration (May 1660) the Duke of York returned to England with the king, and was made lord-high-admiral and lord-warden of the Cinque Ports. In September 1660, he married Anne, the eldest daughter of the Chancellor Hyde. [Hyde.] The Duke of York took an eager part in promoting the war with Holland, and assumed the command of the fleet, which he eventually resigned, as well as his office of high admiral, on the passing of the Test Act, which required all officers, civil and military, to receive the sacrament according to the usage of the Established Church. On November 21, 1673, the Duchess of York having died two years previously, he married Mary Beatrice Eleanora, daughter of Alfonso IV., duke of Modena, then only in her fifteenth year. On November 4, 1677, the duke's daughter Mary, then in her sixteenth year, was, greatly to the public satisfaction, married to her cousin William, prince of Orange.

During the excitement produced by Titus Oates's Popish Plot, in 1678-9, the Duke of York, by the advice of his brother, retired to the Continent. While he was absent, the famous bill for his exclusion from the throne was twice read in the Commons, and ordered to be committed, by large majorities, and was only prevented from being passed in that House by the prorogation of the parliament, May 27, 1679. On his return he became involved in the discredit of giving countenance to the story of the Meal Tub Plot. The share which the duke had in this business only added to the dislike in which he was held by the great body of the nation, and which was still further increased by the severity of his administration of affairs in Scotland, to the government of which country he had been appointed. On again taking up his residence at the English court, he became his brother's chief counsellor, and, much more than Charles himself, the mainspring and director of the conduct of public affairs. To his instigation are chiefly attributed the general attack upon corporations, the executions of Russell and Sidney, and the other violent and despotic acts of the two closing years of Charles's reign. A new exclusion bill which had been brought into the House was twice defeated by the dissolution of parliament.

On the death of his brother, February 6, 1685, no opposition was made to the accession of James. His first act was to issue a proclamation ordering the customs and excise duties to be paid as usual; he went openly and in great state to the illegal celebration of the mass, and lost no time in sending an agent to Rome to make his submissions to the Pope.

He determined however to call a parliament, as he said, simply to humour the English people, he himself being at the same time resolved to make himself independent of its authority, and to dissolve it when it opposed his wishes. In reply to an indirect appeal to the French king, that monarch transmitted to James 500,000 livres, and it was readily agreed, in requital, that the chief obstacle in the way of the seizure by the French king of the Spanish Netherlands should be removed, by the existing treaty between Spain and England being held to have terminated with the death of Charles.

These details of its commencement supply the key-note to the whole course of James's disgraceful reign. The parliaments of England and Scotland met, and responded with the utmost submission to all the king's demands. While they were sitting, both England and Scotland were invaded, the former by the Duke of Monmouth, the latter by the Earl of Argyle, both of whom had for some years been exiles in Holland. Argyle, after the dispersion of his few followers, was apprehended and executed at Edinburgh, on June 30, 1685. Monmouth was defeated July 5, in the decisive battle of Sedgemoor, and, being two days after found concealed in a ditch, was brought to London, and delivered to the executioner on the 15th of the same month. The suppression of Monmouth's insurrection was followed by the savage military vengeance of Colonel Kirke, and the more revolting enormities of the western 'campaign,' as it was jocularly called by the king, of Chief-justice Jeffreys.

Among the arbitrary measures next taken by James, on his own individual authority, were—the abandonment of the legal test of conformity with the Established Church, and of the penal laws against Dissenters; the extinction of the liberty of the press; the bestowal of nearly all public employment upon Catholics; the sending of an ambassador, the Earl of Castlemaine, to Rome; and the reception of a nuncio from the Pope. To some of these measures parliament offered a feeble resistance, while others were quietly submitted to; but on the publication of a second declaration of indulgence to Dissenters, April 27, 1688, which was commanded to be read by the clergy immediately after divine service in all the churches, Sancroft, archbishop of Canterbury, and six bishops, Lloyd of St. Asaph, Ken of Bath and Wells, Turner of Ely, Lake of Chichester, White of Peterborough, and Trelawny of Bristol, met in the archbishop's palace at Lambeth, May 18, and drew up a petition to the king, representing their aversion to obey the order. For this they were all, on June 8, sent to the Tower, and afterwards, on the 29th, brought to trial before the Court of King's Bench, on the charge of publishing a false, fictitious, malicious, pernicious, and seditious libel, when a verdict of Not Guilty was pronounced by the jury, which was received with acclamations by the whole kingdom. This defeat however in no degree checked at the moment the infatuated king. He issued orders to prosecute all those clergymen who had not read his declaration, that is, the whole Church of England, two hundred excepted; he endeavoured to force a Roman Catholic president on Magdalen College, Oxford; and, in the midst of this great contest with the Church and the nation, on June 10, a son was announced to have been born to James.

James's son-in-law, the Prince of Orange, had not been an unobservant spectator of what was passing in England; and to him the hopes of the

English people were now very generally turned. In compliance with the invitation of the heads of the parties in the state, he landed, November 5, 1688, with about 14,000 men, at Torbay in Devonshire. Before the end of that month James found himself nearly deserted by everybody. In the night of December 12, having previously sent over the queen and the young prince to France, he embarked with a single attendant in a boat at Whitehall Stairs, from which he was forced the next day to land at Feversham, and thence returned on the 16th to Whitehall. On the 17th the Prince of Orange, having arrived in London, desired James to leave the palace: he proceeded to Rochester, and on the 23rd embarked on board a frigate, and was conveyed to Ambleteuse in Britany. Thence he repaired to St. Germain's, where Louis XIV. gave him the château of St. Germain's for his residence, and bestowed on him a small revenue.

Meanwhile the English crown was settled upon the Prince and Princess of Orange as King William III. and Queen Mary. [WILLIAM III. and MARY.] In the beginning of March 1689, James sailed from Brest, landed at Kinsale, and immediately marched to Dublin, with a small force supplied by the French king. A few weeks after he laid siege to Londonderry, which however he was not able to reduce. After various military operations, his cause was finally ruined by the defeat received from King William in person at the battle of the Boyne, fought July 1, 1690. He soon afterwards returned to France, and resided at St. Germain's till his death, September 6, 1701.

By his first wife, Anne Hyde, James II. had eight children, all of whom died young except MARY and ANNE, afterwards queens of England. By his second wife, Mary of Modena, he had James Francis Edward, prince of Wales, styled the elder Pretender, born June 10, 1688, died at Rome, December 30, 1765; one son, Charles, who died an infant, and four daughters. He also left several illegitimate children, the most distinguished of whom was James Fitz-James, duke of Berwick.

The principal portion of the papers formerly belonging to the Stuart family, which were obtained by George IV. when regent, has been printed under the title of 'The Life of James the Second, King of England, &c., collected out of Memoirs writ of his own hand. Together with the King's Advice to his Son, and his Majesty's Will. Published from the Original Stuart Manuscripts in Carlton House, by the Rev. J. S. Clarke, LL.B., F.R.S., Historiographer to the King, Chaplain of the Household, and Librarian to the Prince Regent,' 2 vols. 4to., Lond. 1816.

JAMES RIVER. [VIRGINIA.]

JAMESONE, GEORGE, called by Walpole the Vandyck of Scotland, was the son of Andrew Jamesone, an architect, and was born at Aberdeen in 1586. Jamesone and Vandyck were about 1616 fellow pupils of Rubens at Antwerp. When Charles I. visited Edinburgh in 1633, he sat to Jamesone, and presented him with a diamond ring from his own finger. His career is not exactly known, but it must have been a successful one, for he left his wife and family well provided for at his death in 1644; and he bequeathed also much in other directions. Many of the considerable families of Scotland possess portraits by Jamesone, but the greatest collection is at Taymouth, the seat of the Earl of Breadalbane. Sir Colin Campbell, the earl's ancestor, was Jamesone's first and chief patron.

Jamesone's earliest works are painted on pannel; he used afterwards fine canvass, smoothly primed, and prepared in a shade tint. He painted occasionally history, miniature, and landscape. Walpole mentions a view of Edinburgh by him.

Jamesone's daughter Mary excelled in embroidery, and in textile paintings; some of her works are still preserved in the church of St. Nicholas, at Aberdeen.

JAMIESON, JOHN, D.D., the son of the Rev. John Jameson, pastor of one of the churches of Seceders, in Glasgow, was born March 3, 1759. He is best known as the author of the Scottish Dictionary, but he published many other literary works, and was a person of considerable acquirements in various departments of knowledge.

He was sent to the university of Glasgow when he was only nine years old. He commenced the study of theology at the age of fourteen, under the Rev. William Moncrieff, who lectured on that subject to the young men intended for the Secession ministry at Alloa. After having been a session at Alloa, however, he attended the lectures of Dugald Stewart in the university of Edinburgh. In July 1779, having just completed his twentieth year, he was licensed as a preacher by the Seceder Presbytery of Glasgow. After a time he was appointed to a congregation at Forfar, where, upon a stipend of 50*l.* a year, he managed to exist, married, and had a numerous family. He had written some verses and other small matters for some periodical works; but he first properly came out as an author in 1786, when he published, under the title of 'Socinianism unmasked,' an examination of certain opinions deemed heretical which had been promulgated by Dr. Macgill, of Ayr. This work was followed in 1789 by 'The Sorrows of Slavery, a poem;' in 1790 by two octavo volumes of 'Sermons on the Heart;' and in 1791 by 'Congal and Fenella,' a metrical tale, in two parts. After residing at Forfar for many years, he received a call to be their pastor from the Seceder congregation of Nicholson-street, Edinburgh, in which situation Jamieson remained for the rest of his life. To the last much of his time continued to be given to literature; and he published several works both in verse and prose. In 1808 appeared his 'Etymological Dictionary of the Scottish Language,' in 2 vols. 4to.; and in 1818 'An Abridgment of the Scottish Dictionary,' in 1 vol. 8vo. He also produced, in 1820, an edition of Barbour's poem of 'The Bruce,' and Harry the Minstrel's 'Sir William Wallace,' in 2 vols. 4to.

Jamieson was for many years secretary to the Society of Scottish Antiquaries; and he received a pension of 100*l.* a year as an associate of the Royal Society of Literature from its institution till the general withdrawal of the allowances on the

accession of William IV. In 1833 a pension to the same amount was assigned to him from the Civil List. He died at Edinburgh July 12, 1838.

JAN MAYEN, an island in the Arctic Polar Sea, lying between 70° 49′ and 71° 9′ N. lat., and between 7° 26′ and 8° 44′ W. long. It extends from south-west to north-east about 30 miles, and is in no place above 9 miles in breadth. On the northern extremity, where the island is widest, stands the mountain called Beerenberg or Bear Mountain, a snow-capped peak rising to 6870 feet above the sea-level. Even in the beginning of August all the high lands are covered with snow and ice. The coast has several roadsteads with good anchorage in five to ten fathoms water, black sandy ground, but no harbour for a ship. There are foxes and white bears. Water-fowl are numerous. The vegetation is very scanty, and limited to a few plants scattered widely about among the volcanic minerals. The island was discovered in 1611 by a Dutch navigator called Jan Mayen, and was much visited up to about 1640 on account of the great number of whales, which however afterwards retreated to other parts of the Arctic Sea.

JANEIRO, RIO DE, the capital of the empire of Brazil, is situated in 22° 54′ S. lat., 43° 15′ W. long., on the western shores and near the entrance of the Bay of Rio de Janeiro, which extends N. and S. a length of 24 miles, with a breadth of from 4 to 15 miles, and, being inclosed by high hills, forms perhaps the finest, safest, and most capacious harbour in the world. The entrance to the bay, which is about a mile in width, is defended by batteries and fortresses erected on the promontories on each side and on the island of Lagam.

The town extends along the shore about three miles on an undulating plain, the highest point of which is crowned with the church of Nossa Senhora da Gloria. The hills which surround the town are composed of gneiss, intersected by veins of granite. Only a small extent of the town stands S. of the hill da Gloria; the principal part is built N. of this hill on a rocky shore opposite the island das Cobras. A fine pier of stone projecting a short distance into the bay, and ascended by a flight of steps, leads immediately to the Palace Square, two sides of which are occupied by the Imperial Palace. The city extends in the form of a rectangle from N.W. to S.E., and consists of straight and parallel streets, intersected at right angles by others much narrower. A large square, called Campo de Santa-Anna, divides the city from the Cidade Nova, or New Town, which extends westwards to the neighbourhood of the royal villa of San-Christovao.

The streets are paved, and they also have foot-pavements, which however are so narrow as scarcely to admit of two people passing one another. The houses are generally built of stone, and have two stories; the upper one is sometimes of wood: the roofs are covered with tiles. The most distinguished buildings are—the cathedral, the churches De-Candelaria and San-Francisco-de-Paula, the college which once belonged to the Jesuits, the theatre, and the exchange. The town is supplied with water by means of fountains tha are fed by an aqueduct, the most remarkabl structure in Rio, which conveys a stream from th Corcovado mountains (2400 feet above the sea into the city.

Rio de Janeiro contains a population of mor than 200,000. The number of whites and c black slaves seems to be nearly equal. Most o the inhabitants are engaged in commerce. Ther are numerous sugar refineries, tanneries, cotto factories, rum distilleries, train-oil factories, an diamond-cutting establishments. There is a larg library, an academy of arts, a military academy an observatory, a botanical garden, a medica school, and various other literary and scientific in stitutions.

The commerce of Rio is extensive, and on th increase. The principal exports are coffee, suga hides, rice, tobacco, rum, tapioca, ipecacuanha manioc flour, gold, diamonds, &c. The quantit of coffee exported from Rio in 1842-3 was nearl equal to the exports of the article from all othe parts of the world: it amounted to 1,176,13 bags of 154 lbs. each, or 181,125,252 lbs. Th imports, more than one-half of which in value ar derived from Great Britain, include cotton, woo len, linen, and silk manufactures, wines, ironmo gery, flour, meat, fish, butter, spirits, earthenwar paper, &c.

(Cazal, *Corografia Brazilica;* McCulloch's *Commercial Dictionary.*)

JANIZARIES is the name of a Turkish m litia, once formidable, but now extinct. The orig of this body dates from the reign of Amurath, Murad I., who, after having overrun Albani Bosnia, Servia, and Bulgaria, claimed the fif part of the captives, from among whom he cho the young and able-bodied, and had them educat in the Mohammedan religion, and for the milita profession. Until the death of Solyman the Ma nificent the Janizary body was recruited exclusive from captives, but after that time by enrolme of Osmanlees. By the original laws of th body the Janizaries could not marry; the prohi tion was at first evaded, and at last totally dis garded. They were formidable to the gove ment from their numbers and union. Th repeatedly mutinied against the sultans, obliged them to change their ministers, or e deposed them. In more recent times they dethro Selim; and in the beginning of the reign of Sultan Mahmood they broke out into a drea insurrection which lasted three days. At Mahmood resolved to abolish them, and issue proclamation accordingly. A general attack made upon them, in which about 25,000 are to have perished. This carnage took plac June 1825, and from that time the Janizari a body have ceased to exist. MacFarlane, in 'Constantinople in 1828,' gives a vivid accou that catastrophe.

JANSENISTS, a sect which appeared in Roman Catholic Church about the middle of seventeenth century. They took their name Janssen, or Jansenius, bishop of Ypres, in Netherlands, who published a book entitled 'gustinus,' certain propositions in which

decided to be heretical, and were condemned by a bull of Pope Innocent X., in the year 1653, as impious and blasphemous. A great controversy ensued, which caused a schism in the church. The persecutions with which the Jansenists were visited made many fanatics, but the paroxysm subsided after a few years, and Jansenism, as a sect, never afterwards revived.

JANSSEN, CORNELIUS, was born at Amsterdam, and lived several years in England. He was employed by King James I., and painted several fine portraits of that king and of his children, as well as of the principal nobility. His colouring is clear and natural; the carnations are soft, and, except in freedom of hand and in grace, he was esteemed equal to Vandyck. He died in 1665.

JANSSENS, ABRAHAM, born at Antwerp in 1569, was a competitor with Rubens. In colouring he was only inferior to that painter. His compositions are spirited, his drawing correct, his pencil decided, and his draperies natural. He painted subjects illuminated by torchlight, and delighted in the contrast of light and shade. Most of the Flemish churches possess pictures by this master.

JANSSENS, VICTOR HONORIUS, born at Brussels in 1664, was for four years painter to the duke of Holstein, by whom he was sent to Italy, where he took Albano for his model, and became superior in his own style to all his contemporaries. Most of the palaces and churches of his own country are adorned with his compositions. He died in 1739.

JA'NTHINA, or IANTHINA, Lamarck's name for a genus of turbinated testaceous mollusks. Cuvier assigns to the *Janthinæ* a place among his *pectinibranchiate Gastropods*, between the *Pyramidellæ* and the *Neritæ*.

Omitting the anatomical characters of the mollusk, the generic characters may be thus detailed:—Shell ventricose, globular or conoid, very fragile, with a low spire, and the last whorl larger than all the rest together; aperture large, subtriangular, with disunited borders; the columella straight and long, forming the whole of the left border or lip; right border or lip trenchant, and often notched in the middle; colour of all the species hitherto discovered violet, more or less intense. Operculum modified into a vesicular appendage, which serves to suspend the animal at the surface of the water, and which adheres to the posterior and fleshy part of the foot.

Geographical distribution very extensive, the form having been met with in the four quarters of the world floating on the ocean or driven on the shores by tempests. It has occurred on the coasts of our islands; but there is reason for thinking that it is not to be found in very cold latitudes. In warm climates it is very plentiful.

Examples, *Janthina fragilis* and *Janthina globosa*.

JANUARY, the first month in our present Calendar, was also the first month in the more recent Roman Calendar. It was not the first month in the year in this country till 1752, when the legislature, by an act passed in the preceding year, altered the mode of reckoning time from the Julian to the Gregorian style. It consists of thirty-one days, though originally of only thirty days. [PERIODS OF REVOLUTION.]

JANUS, in mythological history, is the earliest of the Italian kings, and reigned in Latium, being contemporary with Saturn. Janus, by some accounts, was the son of the sun, and his attributes appear to connect him with sun-worship. He is the porter of heaven; he opens the year, the first month being named after him; he presides over the seasons, whence he is sometimes represented with four heads (Janus Quadrifrons), and his temples in that capacity were built with four equal sides, but only one entrance. He is the keeper of earth, sea, and sky; the guardian deity of gates, on which account he is commonly represented with two heads, because every door looks two ways; and thus he, the heavenly porter, can watch the east and west at once without turning. (Ovid, 'Fast.,' i. 140.) He usually carries a key in his left hand, and a staff in the other. (Ib., 99.) In war time the gates of his principal temple at Rome, that of Janus Quirinus, were always open; in peace they were closed to retain the wars within; but they were shut once only between the reign of Numa and that of Augustus. As to the probable origin of the word Janus, see the article DIANA.

JAPAN is an empire in Asia, which consists of an unknown number of islands of different dimensions. These islands may be considered as constituting the western boundary of the Pacific between 31° and 48° N. lat. Between these islands and the continent of Asia is a closed sea, called the Sea of Japan, which at its southern extremity is united to the Tong-Hai by the Strait of Corea, and at its northern with the Sea of Okhotzk. The Sea of Japan is united to the Pacific by several straits, which divide the Japanese Islands from one another. Japan is situated between 129° and 150° E. long. It is divided into Proper Japan and the dependent islands.

Proper Japan consists of three large islands, Kioosioo, Sitkokf, and Nipon or Nifon, which are surrounded by a great number of smaller islands. Kioosioo, the most western, may be about 200 miles long, with an average breadth of 80 miles; it has three deep bays, and is separated from Sitkokf by the Boongo Channel, and from Nipon by the Suwo Sound and the Strait of Simonoseki. Sitkokf may be 150 miles long, with an average breadth of 70 miles. Nipon, the largest and the principal of the Japanese Islands, has a curved form; its length, measured along the middle of the island, exceeds 900 miles, and its average width may be estimated at more than 100 miles. The largest bays are along the southern coast, as Osacca Bay, Mia Bay, and Yedo Bay.

The dependent countries are the large island of Yeso, with some of the Kurile Islands and the southern districts of Tarakai. Yeso is about 250 miles long, by 100 broad. The Japanese Kurile Islands are Uturup and Kunashir. The island of Tarakai is divided from Yeso by the Strait of Perouse.

All these islands are imperfectly known. Nearly

all the coasts are very difficult of access, being surrounded by numerous rocks and islands, and by a very shallow sea. There are also dangerous whirlpools, and very heavy gales along the coasts. The government also and the laws of the Japanese are less favourable to intercourse with foreigners than those of any other country on the globe, China not excepted. Under such circumstances our knowledge of the country is very scanty and imperfect.

From the peculiar form of these islands it may be presumed that they have no large rivers, and that the country in the interior rises to a considerable height. Many of the rivers are so rapid that no bridges can be built over them, and they are not passed without danger. A considerable number however seem to be navigable for small river-boats to a distance of some miles from the sea.

In no part of the world is agriculture carried to a higher degree of perfection than in Japan. Nearly all the declivities of the hills are formed into terraces, and these terraces are cultivated with the utmost care. The produce comprises rice, wheat, barley, rye, maize, millet, batatas, potatoes, cotton, silk, hemp, and a very great variety of fruits and esculent vegetables.

The horses are of a middling size, but strong. The number is small, as horses are only used for the saddle and by the princes. Horned cattle are still less numerous. The Japanese do not use either their flesh or their milk, and they are only kept for draught. Buffaloes and swine are met with in small numbers. Fowls, ducks, and geese are plentiful, but principally valued for their eggs, of which the Japanese are very fond. Of wild animals the supply seems to be limited; but the fish on the coasts are abundant.

Japan abounds in mineral wealth. Gold seems to be very plentiful in several provinces, but is only partially worked. Silver, iron, and tin exist in small quantities; copper is more plentiful. Salt and porcelain clay abound.

All travellers speak of the populousness of the country and the extent of the villages, which frequently occupy two English miles and more in length. In some more fertile districts they are so close to one another as to form nearly one contiguous street; as, for instance, in the plain which extends from the harbour of Osacca to Meaco.

I. The island of Kioosioo is extremely well cultivated, and generally fertile. The best known towns of importance are Nagasaki, Sanga, and Kokoora. *Nagasaki* lies on a peninsula formed by the deep Bay of Omoora, in 32° 45′ N. lat., and 129° 15′ E. long. Its harbour is spacious and deep, and at its entrance is the small island of Papenberg. The town is built on the eastern shores, in a narrow valley. It is three quarters of a mile long, and almost as broad, and inclosed by steep though not high hills. There are several temples and palaces, and a population of 18,000 or 20,000. Nagasaki is one of the five imperial towns of Japan. *Sanga*, situated on a plain at the northern extremity of the Bay of Simabarra, is a large, populous, and busy town. *Kokoora*, near the entrance of the Strait of Simonoseki, is also a considerable place.

II. The island of Sitkokf is almost ent unknown to Europeans.

III. Nipon, or Nifon, contains the la towns and the best manufactories of the em The chief towns are the following:—*Simono* on the strait of the same name, has an a coasting trade. *Muru* has a safe harbour, many tanneries. *Osacca*, the chief comme emporium, stands on the river Yedogawa. Se navigable canals traverse the principal stree the town, and serve as means for conveyan goods. The banks of the river and of the c are of freestone, coarsely hewn, and formed ten or more steps, so as to resemble one conti staircase. Numerous bridges, built of cedar-w are laid over the river and canals. The st are narrow but regular, and cut each other at angles; though not paved, they are very clea narrow pavement of flat stones runs in fro the houses for the convenience of foot-passen The houses are not above two stories high, built of wood, lime, and clay. At the n eastern extremity of the city is a large c The population is very great; and many of inhabitants are wealthy. *Meaco* or *Kio* is a large city, and the residence of the Daïri, or e siastical emperor. Besides containing many buildings, Meaco is the principal manufact town of the empire, where every kind of m facture is carried to the greatest perfection. N every house has a shop, and the quantity of which they contain is astonishing: at the time it is the centre of science and litera and the principal place where books are pri it is also the residence of the lord-chief-justi the empire, who is invested by the emperor supreme authority over all officers of govern Other considerable towns of Nipon are *Kwano*, and *Mia*. But the chief Japanese *Yedo*, the size and population of which ar known, though certainly large. A river through the town, and sends off a consid arm, which incloses the imperial palace, or t the Kubo, or secular emperor. There are s good bridges over the river. The palac fine, but low; and rows of trees are planted the numerous canals which traverse the tow

IV. The island of Yeso is little known. of its chief towns are *Kokodade* and *Mats*

The Japanese are well made and Their eyes show their Mongol origin, bei long, small, and deeply sunk in the head. hair is black, thick, and shining, and their although not flat, are rather thick and Their complexion is yellowish. In manufa industry and in scientific knowledge they be nearly equal to the Chinese, and in s ticles the Japanese are superior. Their m tures in metals, silk, cotton, china, glass, and and their cabinet-work, are highly esteeme most ancient religion is that of the Sint was said to be the offspring of the sun, a the founder of the ancient royal family the empire. But the greater part of habitants have embraced Buddhism, which to have been introduced from Corea at remote epoch. There are also a few Con

heterodoxy, introduced by the Portuguese, has been forbidden.

The government is despotic; but the emperor himself is considered as subject to the laws, which are of long standing and cannot easily be changed. There are in fact, two emperors, one of whom is sort of Pope. The government of the provinces resembles in some respects the ancient feudal system of Europe. According to Meylan, the population of the country is divided into eight classes:—the princes or governors, the nobility, priests, military, civil officers, merchants, artisans, and labourers. All these dignities, offices, and employments are hereditary.

The inland trade is very considerable. The coasting trade is much favoured by the great number of small harbours, and the interior communication by well-planned and well-maintained roads, which are always thronged with carriages and people. The foreign commerce is chiefly with the Chinese.

JAPANNING is the art of producing a highly polished surface on wood, metal, or other hard substance, sometimes of one colour only, but more commonly figured and ornamented. The process has received its name from that of the island of Japan, whence articles so varnished were first brought to Europe; though the manufacture is also extensively practised by the Chinese, Siamese, Birmese, and other nations of eastern Asia, among whom it was suggested most probably by the profession of a tree, which affords with little preparation a beautiful varnish, exceedingly well adapted for the purpose, and which hardens better than those prepared in Europe. [VARNISH TREE.]

The appearance of japanned work is as various as the taste and fancy of the artists employed in it. Sometimes it is a plain black or red, with a gilded or painted border; or it is an imitation of marble, of fine grained or rare wood, or of tortoise-shell; sometimes a drawing, with high finish, brilliant colour, and showy patterns; and occasionally fine copperplate engravings are applied to a japanned surface with good effect. In all cases the work is highly polished and varnished.

Japanning is applied to ladies' work-boxes and work-tables, to toilet-boxes, cabinets, tea-caddies, fire-screens, tea-trays, bread-baskets, snuffers and trays, candlesticks, and a variety of other articles.

Three processes are usually required in japanning: laying the ground, painting, and finishing. In addition to these processes, whenever the matter to be japanned is not sufficiently smooth to receive the varnish, or when it is too soft or porous, it is sometimes prepared or primed before any of the proper japanning processes are applied. Almost every workman has his own peculiar modes of working, and his own receipts for making and mixing his varnishes.

In whatever manner the work has been painted or printed, or if all addition to the plain colour of the ground has been dispensed with, nothing now remains but the finishing. This is a very simple process: the workman chooses a suitable varnish, and passes it over the work with a brush several times, until he judges the coating to be thick enough to bear the polish. It is an important precaution not to begin the varnishing until the preceding work is thoroughly dry, and to dry perfectly each coat before laying on a succeeding one. A hot stove is used in the best establishments to aid in drying the work. When thick enough, the varnish is polished by rubbing it with a rag dipped in finely powdered tripoli or rotten-stone. Towards the end of the operation a little oil is also applied to the rag; and the work is completed by rubbing with oil alone, to clear off the powder or any other impurity.

JARNAC. [CHARENTE.]

JASHER, BOOK OF, or the 'Book of the Upright,' is twice referred to in the Old Testament as a work of authority. (Josh. x. 13; 2 Sam. i. 18.) Many conjectures have been formed concerning the author and contents of this book; but the work appears to have been lost before the time of the Babylonish Captivity. In the year 1751 a pretended translation was published by a printer of the name of Ilive.

JASIONE, a genus of plants belonging to the natural order *Campanulaceæ*. There is only one British species of this genus.

JASMINACEÆ, a natural order of monopetalous Exogens. Only four genera of this order have yet been discovered, the principal being *Jasminum* itself, which consists of a large number of species, found in Europe, Africa, Asia, and Australia.

JASON. [ARGONAUTS.]

JASPAR. [QUARTZ.]

JASSA, a genus of amphipodous Crustaceans, established by Dr. Leach.

The general characters resemble those of *Corophium*, Latreille, but differ from them as well as from those of *Podocerus*, Leach, in the considerable size of the hands of the first four feet, which are oval; those of the second pair being the greatest, and armed with teeth more or less numerous on the internal border. Eyes not projecting.

Dr. Leach records two species: one, *Jassa pulchella*, from the south coast of Cornwall, where it was found in the midst of sea-weed; the other, *Jassa pelagica*, found near the Bell Rock, Scotland.

JASSEY, or YASSY. [MOLDAVIA.]

JATROPHA, a genus of plants, containing among its numerous species the *Jatropha Manihot*, a Brazilian and Guyana plant, the fæcula of which forms a well-known nutritious substance called *Cassava*, when prepared in one manner, and *Tapioca* in another state.

JAUNDICE (from *jaune*, yellow) is the name given to those diseases in which, the excretion of the bile being prevented, it is retained in the blood, or reabsorbed, and, being diffused throughout the system, gives a yellow colour to the skin, and all the other tissues and secretions.

Everything which obstructs the main trunk of the bile-ducts, as gall-stones or other foreign bodies filling its canal, morbid alterations of the liver or duodenum, or of the duct itself, tumours and enlargements of adjacent organs, and inflammation of the liver, will produce jaundice. But

the most frequent cases are those which do not appear to be the consequence of any organic disease, but are accompanied by the symptoms of general disorder of the digestive organs, as nausea or vomiting, thirst, and loss of appetite, confined or irregular condition of the bowels, headache, and general uneasiness.

It is impossible that any one mode of treatment should be adopted for a symptom depending on such varied causes. Where the obstruction is mechanical, the jaundice is of course curable only by the removal of its evident cause; and in inflammation of the liver it is but a symptom of a more important disease, to which the treatment must be directed. In the more common cases, which, as distinguished from these, are sometimes called functional, the treatment should consist chiefly of small doses of mercury, and active purgatives containing calomel or neutral salts.

JAVA, one of the Greater Sunda Islands, is situated between 5° 52′ and 8° 4′ S. lat., and between 105° 11′ and 114° 13′ E. long. The length is 660 miles; the breadth varies from 56 to 135 miles. The area is estimated at 50,000 square miles. The population in 1845 was about 10,000,000, which is said to be twice the amount that it was in 1815.

The shores are washed by the Indian Ocean, the Java Sea, the Straits of Sunda, and the Straits of Bali. The island of Madura, almost close to Java, is 91 miles long, and 31 miles wide in the widest part.

Surface and Soil.—The southern coast in its whole extent is high and steep. It runs in a continuous line, with few indentations, and those not deep. Consequently there are few places which have good anchorage.

The hilly country which is contiguous to the southern coast rises rapidly as we advance inland, and probably attains towards the middle of the island a mean elevation of more than 1000 feet, where it extends in elevated plains with an uneven or hilly surface. Several ridges traverse this elevated region, having numerous volcanic peaks, some of which attain an elevation of from 10,000 to 11,000 feet. The hilly region contains also some extensive plains and fertile valleys, inclosed by the peaked ridges. The elevated and hilly region terminates to the north in rather a steep slope, and between it and the Java Sea extends a flat country which descends imperceptibly from the foot of the hills to the very shores, where it terminates in some places in swamps.

The northern coast is lined by numerous small islands, and is marked by many projecting points and headlands. Accordingly the harbours are numerous; and the adjacent seas are navigated by numerous vessels of small tonnage.

The soil of Java is generally deep and rich. The best soils are alluvial, along the beds of the rivers, but the whole island is far above the average degree of fertility. Java is watered by numerous rivers, but few of them have a considerable course on account of the comparative narrowness of the island. Five or six are navigable at all times to a distance of some miles from the coast. The rest, in number many hundreds, if not thousands, are used to irrigate the fields. T chief rivers are the Solo and the Kediri, or Su baya. There are two or three swamps, but lakes.

In Java, as in other countries between tropics, the year is divided into a wet and a season, and these seasons depend on the periodi winds. The degree of heat varies considerably the low lands and the hilly region. The elevat of the interior offers the rare advantage, that fr the sea-shore to the top of the mountains there almost, from one end of the island to the other regular diminution of temperature, at the rate two or three degrees of Fahrenheit for every miles. Hurricanes are unknown; but thund storms are frequent and destructive, and ea quakes are common in the vicinity of the volcanc

Though not equal to the Hindoos in agricult the Javanese are far superior to their immedi neighbours of the other islands. They are v acquainted with the cultivation of rice and ot grains, and with the advantages of irrigati Wheat has been introduced by the Dutch, and cultivated on the more elevated lands. Millet grown in some places on a limited scale. Am the many esculent roots cultivated, the principal the yam, the sweet potato, the Java potato, arr root, the common potato, artichokes, cabbages, peas. The Javanese also cultivate cucumb onions, capsicums, cocoa-nuts, ground-nuts, A palm, betel, tobacco, coffee, sugar, pepper, ca mom, ginger, cotton, and great varieties of d stuffs, and fruits. They procure oil from man their trees, and make toddy from the palm.

There are no elephants, camels, or asses. horses are of a small breed, but strong, fleet, well made. Buffaloes are numerous, and of gre use in agriculture than any other animal. B cattle and goats are common, but sheep and scarce. There are tigers, tiger-cats, leopa jackals, rhinoceroses, and other wild animals, also crocodiles and serpents. Domestic fowl fish are very abundant.

Few minerals are known to exist in Java; iron, sulphur, salt, and saltpetre are obtained.

Political Divisions, Towns, &c.—The gre part of the island is in possession of the D The districts situated on both extremities of island, as well as the whole of the northern are immediately subject to them. The re owned by two native princes, the Susuhúna emperor) and the Sultan.

1. The Dutch possessions are divided int provinces. The country west of 108° 30′ prehends five of them, Bantam, Batavia, B zorg, the Preanger districts, and Cheribon. most considerable and remarkable towns i country are on or near the northern shores. *rang*, where the governor of Bantam resides thriving place some miles inland, and distant the ancient town of Bantam, which has abandoned. *Batavia*, which once had a p tion of 160,000, contained in 1834 not mor 54,000 inhabitants, having been partly aban on account of its unhealthiness. *Rywick*, th of the general governor, contains a fine pala beautiful square, called the Royal Place.

Prahon is the central point of the military force, with extensive barracks; and *Noordwyk* is inhabited by the merchants and people in trade. *Cheribon* is a thriving town, with a good roadstead and 10,000 inhabitants. Among the inland towns is *Buitenzorg*, a thriving and well built town, 40 miles from Batavia; it is united to the harbour of Batavia by a navigable canal.

The Dutch possessions east of 108° 30′ to the Strait of Madura contain the nine provinces of Tegal and Bagnes, Pekalongan, Kedú, Samárang, Japara, Rembang, Grissik, and Surabaya. The chief towns from west to east are the following:—*Samárang*, with more than 30,000 inhabitants, has an extensive commerce. *Rembang* has 8000 inhabitants and some trade. *Surabaya* has an excellent harbour, a flourishing trade, and 80,000 inhabitants. The eastern peninsula contains three provinces, Passaruan, Besuki, and Banyuwangi, of which the last is noted for its coffee, which is stated to be superior to that of Mocha, and for the great quantity of sulphur which abounds here. Passaruan is a small town on the sea-coast.

2. The dominions of the Susuhúnan, which contain a population of nearly one million, consist of two separate tracts. The largest lies between 108° 30′ and 110° E. long., and contains the fertile vale of Banyumas, with the town of the same name, which has 8000 inhabitants. From it the smaller portion is separated by the Vale of Kedú and some territories of the Sultan. It lies in the interior of the island, between 110° 30′ and 111° 20′ E. long., and contains the residence of the Susuhúnan, called Sura-karta, on the Solo River, which has a population of 105,000.

3. The territories of the Sultan extend between 110° and 112° 20′ E. long., and contain nearly 700,000 inhabitants. In their eastern districts lie the fertile plain of Kediri. The capital is Yugyakarta, a town with 90,000 inhabitants.

Inhabitants.—The natives of Java belong to the widely spread race of the Malays. They are short, but neat, and robust. The religion is Mohammedanism, modified by Buddhism. Three different Dialects of the Malay language are spoken on the island, but they have also an ancient sacred language called Kawi, which contains a great number of Sanscrit words. The Javanese have a native literature, which however is not rich. They have also translations from the Sanscrit and Arabic. In civilisation the Javanese are much superior to all other nations who inhabit the Indian Archipelago. They show skill in manufactures of cotton, silk, and shipping. The population is between 4,500,000 and 5,000,000.

Java is extremely well adapted for an extensive commerce. The island itself is rich in productions, and its northern coasts, which are accessible to vessels all the year round, lie opposite the richest countries of Asia. Besides this, the Dutch government has made it the centre of all the trade which Holland carries on with its extensive settlements in the Indian Archipelago. Hence the transmission of native produce to other countries, and the importation of foreign commodities, are both very large. The exports of British produce and manufactures to Java, in 1846, amounted to 355,000*l.*, of which by far the largest items were cotton and linen goods. The produce of the Dutch possessions in Java was in 1845—coffee 144,861,372 lbs., sugar 112,000 tons, indigo 1,151,368 lbs., cochineal 146,000 lbs., tea 984,529 lbs., pepper 461,650 lbs., cinnamon 250,550 lbs., tobacco 1,500,000 lbs. In the year 1828, the island supplied Great Britain with only 15,000 tons of sugar; in 1847, the quantity of sugar imported from Java into Great Britain amounted to 75,000 tons.

History.—The Portuguese reached Java in 1511, and soon after began to form small settlements. The Dutch established themselves at Bantam in 1575, and in 1602 the English erected a factory at the same place, which was the first possession of the English in the East Indies. But the English as well as the Portuguese were soon obliged to give way to the Dutch, who built the town of Batavia, and by degrees enlarged their dominion, until they succeeded, about the middle of the last century, in dividing the empire of the Susuhúnan into two parts, and appropriating the greater portion of it to themselves. The two sovereigns became at the same time dependent on the Dutch government, and have since been obliged to sell to them, at fixed and low prices, considerable quantities of rice, pepper, sugar, and coffee. The Dutch also claim the right of confirming the successors of the sultans. When Holland was united to the empire of Bonaparte, the British took possession of the island in 1811, but restored it to the Dutch, after the fall of Bonaparte, in 1816.

JAVOLENUS PRISCUS, a Roman jurist, from whom there are a few excerpts in the Digest. His period is not quite certain, but he was the master of Salvius Julianus, who drew up the Edictum Perpetuum under Hadrian. He is probably the Javolenus Priscus mentioned by the younger Pliny ('Ep.' vi. 15), who stopped by a timely answer Passennus Paulus from inflicting his poetry on him. According to the Florentine Index, Javolenus wrote fifteen books 'ex Cassio,' that is, Caius Cassius Longinus, fourteen books of Epistolæ, and five books 'Ad Plautium.' He was also the author of an Epitome of the Libri Posteriores of Labeo, and made notes on them. (*Dig.* 40, tit. 12, s. 42.)

JAXT, or *Jagst*, a province of Würtemberg, bordering N.W. on Baden, and N. and E. on Bavaria, has an area of 2104 square miles, and a population of 325,545. The province is divided into 14 bailiwicks. The chief town is *Ellwangen*, a small place of 3000 inhabitants. The principal rivers are the Jaxt, from which it has its name, the Kocher, and the Rems. The greater part of the possessions of the princes of the House of Hohenlohe is situated in this circle. The House, which is descended from Eberhard, duke of Franconia, who died in 918, now consists of two principal lines, Hohenlohe Neuenstein and Hohenlohe Waldenburg. The first, which is Protestant, is divided into three branches, named Langenburg, Oehringen (formerly Ingelfingen), and Kirchberg, from the territories in the province that belong to them. The second main line,

which is Catholic, is likewise divided into three branches: Hohenlohe Bartenstein, H. Bartenstein-Jaxtberg, and H. Schillingsfurst. Besides Ellwangen the most important towns are—*Hall*, an ancient and picturesque town situated on the Kochar, and famous for its salt-mines; population 6800: *Schorndorf*, a walled town near the Neckar, with tobacco factories and 3850 inhabitants: *Gmünd*, a manufacturing town farther E., on the south bank of the Neckar, with 5800 inhabitants: and *Oehringen*, N.W. of Hall, the residence of the Princes of Hohenlohe Oehringen; population 3194.

JAY. [CORVIDÆ.]

JAYADE'VA, a celebrated Hindoo poet. The only extant poem of Jayadeva is entitled 'Gîta Govinda;' that is, 'the Poem in honour of Govinda,' one of the names of Krishna. The poem is a kind of pastoral drama, in which the loves of Krishna and Râdha are described in a glowing and voluptuous manner. An English translation of 'Gîta Govinda' was published by Sir William Jones in the third volume of the 'Asiatic Researches.' A very accurate edition of the original text, with notes, and a Latin translation, edited by Lassen, was published at Bonn, 1836.

JEAN II., son of Philippe de Valois, and of Jeanne of Burgundy, ascended the throne of France upon his father's death in 1350. At the beginning of his reign he invited King Charles of Navarre to an interview at Rouen, and there arrested him, and put to death several lords of his suite. The brother of Charles applied to Edward III. of England for assistance. In 1355 Edward sent his son the Black Prince into France, who, after ravaging several provinces, was met by King Jean near Poitiers, with 80,000 men, the English being only 10,000 in number, on Sept. 19, 1356: the French were completely defeated, and Jean was taken prisoner and conducted to London. Meanwhile the citizens of Paris revolted against the Dauphin Charles, and soon afterwards the peasants, or serfs, broke out into insurrection, with circumstances of frightful atrocity. This servile war, called La Jacquerie, lasted during the years 1357 and 1358, until the Dauphin with a large force fell upon the peasants and massacred them by thousands. In May 1360 peace was concluded at Bretigny between France and England, Edward giving up his claims to Normandy and France, and assuming the title of sovereign lord of Aquitaine, with the consent of the Dauphin, who promised to pay a large ransom for his father. Jean was then restored to liberty; but he found so great an opposition among his nobles to the fulfilment of the conditions of the treaty, that he returned to London, where he took up his old quarters in the Savoy. He died in London, in April 1364, and was succeeded in France by his son Charles V.

JEAN-D'ANGELY, ST. [CHARENTE-INFE'RIEURE.]

JEAN-DU-GARD. [GARD.]

JEAN-DU-LUZ, ST. [PYRE'NE'ES, BASSES.]

JEAN-PIED-DE-PORT, ST. [PYRE'NE'ES, BASSES.]

JEDBURGH. [ROXBURGHSHIRE.]

JEDO, or JEDDO. [JAPAN.]

JEFFERSON, THOMAS. Thomas Jefferson is the father of modern Republicanism. During a long and laborious life, both in official situations, which gave him opportunities that his activity never let slip, and in private life, in his extensive correspondence and intercourse with persons of all countries, he constantly, perseveringly, and honestly maintained what he conceived to be the principles of pure republican institutions. In the ardour of youth, his zeal and energy mainly contributed to animate his countrymen to declare their independence on a foreign power. In his maturer age, when a member of the General Administration, he struggled, and he struggled at one time almost alone, against a monarchical and aristocratical faction, to maintain the great principles of the Revolution, and develope the doctrines of a pure unmixed popular government. His influence gave to these doctrines a consistency, and a form, and a distinctness, which the mass of the nation could easily seize and retain. He thus became the head of a party in the United States, which, whether always rightly appealing to his doctrines or not for the vindication of their acts, still regards him as the father of their school and the expounder of their principles. By his plain and unaffected manners, and the freedom with which he expressed his opinions on all subjects, he gave a practical example of that republican simplicity which he cultivated, and of that free inquiry which he urged upon all. Such a man must always have many friends and many enemies. From his friends and admirers he has received perhaps not more praise than those who believe in the truth of his doctrines and the purity of his conduct are bound to bestow; by his enemies both at home and abroad, he has been blackened by every term of abuse that bigotry, malice, and falsehood can invent.

Thomas Jefferson was born April 2, 1743, at Shadwell, now in the county of Albemarle, in Virginia. He was educated at the College of William and Mary, at Williamsburg, then the capital of the colony, where he studied mathematics, ethics, and other branches of knowledge. In addition to his general acquirements, he made himself well acquainted with the best Greek and Latin writers, and to the end of his long life retained his ability to read them. Mr. Jefferson studied law under Mr. Wythe, then a lawyer of eminence. He made his first appearance at the bar of the General Court in 1767, at the age of 24, about two years after the misunderstanding between Great Britain and the Colonies had commenced. He practised for seven or eight years in the General Court, when he was called away to more important duties by the political events that preceded the American Revolution. In 1769 he was elected a member of the House of Burgesses for the county of Albemarle. In the session of this spring the House unanimously came to resolutions in opposition to those which had been lately passed in England by both houses of parliament on the affairs of Massachusetts. This measure, which was accompanied with the declaration that the right of levying taxes in Virgi

was exclusively vested in its own legislature, and others of a like tendency, induced the governor, Lord Botetourt, abruptly to dissolve the Assembly.

In 1773, on the meeting of the Virginia Assembly in the spring, Mr. Jefferson was an active member in organising the Standing Committee of Correspondence and Inquiry, the main objects of which were to procure early intelligence of the proceedings of the British parliament, and to maintain a constant communication among all the colonies. On the dissolution of the Assembly, in May 1774, by the governor, Lord Dunmore, eighty-nine members met at the Raleigh Tavern, and, among other things, recommended the Committee of Correspondence to communicate with the Committees in the other colonies 'on the expediency of appointing deputies for the several colonies of British America, to meet in General Congress, at such place annually as should be thought most convenient,' to consult on their common interests. It was also forthwith agreed that the members who might be elected under the writs at that time issuing in the colony of Virginia should meet in Convention at Williamsburg on the 1st of August following, in order to appoint delegates to the Congress, if such General Congress should be approved by the other colonies. The Convention did meet, and thus formed the first popular assembly in Virginia uncontrolled by governor or council. The General Congress, consisting of fifty-five members, met at Philadelphia, September 4, 1774. The disputes which had broken out between Lord Dunmore and the Assembly of Virginia were continually increased by fresh causes of mutual irritation. After proclaiming martial law, and offering freedom to the slaves, and setting fire to Norfolk, Dunmore made his escape by sea. Thus ended the colonial government in Virginia.

On the 21st June, 1775, Mr. Jefferson took his seat in the General Congress, as one of the delegates from Virginia, and was appointed one of a committee for preparing a declaration of the cause of taking up arms. A part of the address which he drew up was finally adopted. In 1776 Mr. Jefferson was again a delegate to Congress, and one of a committee appointed to draw up a Declaration of Independence. Before it was shown to the committee, a few verbal alterations were made in it by Dr. Franklin and Mr. (afterwards President) Adams. After being curtailed about one-third, and receiving some slight alterations in the part retained, it was agreed to by the House, July 4, and signed by all the members present, except one.

From this time Mr. Jefferson's public life is interwoven with the history of his native state, and with that of the United States. He was governor of Virginia in part of 1779, 1780, and part of 1781, in which year the state suffered considerably from the incursions of Lord Cornwallis; and at the close of his period of office he narrowly escaped being taken prisoner by Colonel Tarleton in his own house at Monticello, in the county of Albemarle.

In May 1784, Mr. Jefferson was appointed by Congress minister to France, where he remained five years. His industry and methodical habits enabled him to devote a great deal of his time to the examination of everything that could prove beneficial to his countrymen. His correspondence during this period shows the variety of his pursuits, his unwearied industry, and his unbounded zeal for every improvement that could benefit the social condition of man. He witnessed the beginning of the political troubles of France which followed the convocation of the States General in 1789, and he saw the doctrine of his own Declaration of Rights planted in a soil which brought forth fruits which he neither wished nor expected.

He returned to America at the close of 1789, and in the next year he was appointed secretary of state by the president, General Washington. He held this office till the end of 1793, when he resigned. From 1793 to 1797 he lived in retirement. In 1797 he was elected vice-president of the United States, and in 1801 was chosen president, in place of Mr. Adams, by the House of Representatives, on whom the election devolved in consequence of the equal division of the electors' votes between Mr. Jefferson and Colonel Burr. He was elected a second time, and after fulfilling his term of eight years retired to his favourite residence at Monticello, near the centre of the state of Virginia.

The nation was indebted to Mr. Jefferson's administration for the acquisition of Louisiana, and with it the free navigation of the Mississippi. Louisiana was purchased from the French for 15,000,000 dollars. Mr. Jefferson himself thought that the most important service which he rendered to his country was his opposition to the federal party during the presidency of Mr. Adams, while he was himself vice-president of the United States. Mr. Jefferson's own administration was characterised by unwearied activity in the promotion of all those measures which he believed to be for the general welfare. He never allowed considerations of relationship or friendship to bias him in the selection of proper persons for offices; he always found, as he says, that there were better men for every place than any of his own connections.

The last years of his life were spent in retirement. But he continued his habits of early rising and constant occupation; he maintained an extensive correspondence with all parts of the world; received at his table a great number of visitors, and was actively engaged in the foundation of the University of Virginia, which was established by the state of Virginia, near Charlottesville, a few miles from Monticello. Though often baffled, he finally succeeded, by the help of his friends in the Virginia Legislature, in obtaining ample grants for the buildings, library, and the salaries of the professors. He planned the buildings, and superintended their erection; drew up with his own hand a well digested and copious catalogue of books for a library, a large part of which were purchased in Europe and ready for use when the university opened in 1825; and he prevailed with the visitors of the institution to send an agent to Europe to select four of the professors. This last circumstance shows that Mr. Jefferson did not

cherish such an unreasonable hostility to Great Britain as his enemies have charged him with.

He died July 4, 1826, just half a century after that day on which the Declaration of Independence was signed. Mr. Adams died on the same day. Mr. Jefferson is buried in the grounds near his own house. A simple inscription, which was found among his papers after his death, recording him as the author of the Declaration of American Independence, of the Statute of Virginia for Religious Freedom, and Father of the University of Virginia, is placed on his tomb. The fact of his having been president of the United States is not mentioned.

The latter days of Mr. Jefferson were embittered by pecuniary difficulties, which were owing in some measure to the neglect of his estates during his long absence on the public service; and in a great degree to an obligation which he incurred to pay a friend's debts. (See an excellent letter to Mr. Madison, February 17th, 1826.)

In a paper written by Mr. Jefferson, he enumerates his public services, among which are the act for the prohibition of the importation of slaves, the abolition of entails, the abolition of primogeniture, the abolition of a dominant form of religion, and the establishment of the University of Virginia.

When Mr. Jefferson was a member of the colonial legislature, he made an effort for the emancipation of slaves; but all proposals of that kind, as well as for stopping the importation of slaves, were discouraged during the colonial government. The importation of slaves into Virginia, whether by sea or land, was stopped in 1778, in the third year of the Commonwealth, by a bill brought in by Mr. Jefferson, which passed without opposition, and, as Mr. Jefferson observes, 'stopped the increase of the evil by importation, leaving to future efforts its final eradication.'

Mr. Jefferson married, in 1772, Martha Skelton, the widow of Bathurst Skelton. She died ten years after their marriage. One daughter, and a numerous family of grandchildren and great-grandchildren survived him.

He was the author of 'Notes on Virginia,' which have been several times printed; but his reputation as a writer rests on his official papers and correspondence, of which latter, we believe, that which is published forms only a part of what he left behind him. 'As an author,' observes his biographer, 'he has left no memorial that is worthy of his genius; for the public papers drawn by him are admired rather for the patriotic spirit which dictated them than for the intellectual power which they exhibit. They presented no occasion for novelty of thought or argument or diction. His purpose was only to make a judicious and felicitous use of that which everybody knew and would assent to; and this object he has eminently fulfilled.' But one of his letters (Tucker's 'Life of Jefferson,' ii. p. 384) is of itself enough to exalt him to the rank of a first-rate writer. In a few words, he has sketched the character of General Washington—with a fidelity which belongs only to intimate knowledge, with a sincerity and love of truth which ennoble himself no less than the subject of his eulogy, with a precision and a force unrivalled by any literary essay of this kind, and with that profound but well-tempered admiration and respect which are due to the memory of so wise, so good, and so great a man. Much has been said and conjectured as to the religious opinions of Mr. Jefferson, and his supposed infidelity has been the ground of much bitter attack on his character. In the latter part of his life he used to call himself a Unitarian, when questioned on the subject by any of his friends. Perhaps his published correspondence presents the best means of judging of his religious opinions. Though decidedly approving of the morality which the gospel inculcates, it does not appear that he can be ranked among any particular class of believers.

(Tucker's *Life of Jefferson*, 2 vols., London, 1837; Jefferson's *Memoirs, Correspondence, &c.*, London, 1829; *Journal of Education*, No. VII., *On the University of Virginia*, by Professor Tucker.)

JEHANGHIR. [Mogul Empire.]

JEJU'NUM. [Intestines.]

JELATMA. [Tamboff.]

JELLY-FISH. [Ciliograda.]

JEMAPPES. [Hainault.]

JENA, a town in the Grand-Duchy of Saxe-Weimar, is situated on the Saale, over which there is a stone bridge of nine arches, in 50° 56′ N. lat., 11° 37′ E. long. The ramparts and moats which formerly surrounded the town have nearly disappeared. Jena is the seat of a supreme court of appeal, and of several learned societies. It is however chiefly celebrated for its university, which was founded in 1557. The university has a library of 100,000 volumes, and there are in connection with it a botanic garden, a veterinary school, a school of midwifery, an anatomical theatre, a clinical institution, a collection of physical and mathematical instruments, a cabinet of minerals, an observatory, &c. The population of the town, exclusive of the university, is 5882. Jena has acquired celebrity from the disastrous defeat of the Prussians by the French, which took place near it on the 14th of October, 1806. [Auerstadt; Bonaparte.]

JENNER, EDWARD, M.D., was born in 1749, at Berkeley, in Gloucestershire. He was apprenticed to Mr. Ludlow, a surgeon at Sodbury, and was afterwards a pupil of John Hunter, in London. In 1773 he returned to his native village, and practised as a surgeon and apothecary till 1792, when he obtained the degree of M.D. from the university of St. Andrews.

The history of Dr. Jenner's professional life is embodied in that of vaccination. While at Sodbury he learned that it was a popular notion in that district that milkers, who had been infected with a peculiar eruption which sometimes occurred on the udder of the cow, were completely secure against the small-pox. Notwithstanding the ridicule of his friends, among whom was Hunter himself, Jenner proceeded to investigate the subject. He found that there were some persons to whom it was impossible to give small-pox by inoculation, and that all these had had cow-pox.

In 1788 he carried a drawing of the casual disease, as seen on the hands of milkers, to London, and showed it to Hunter, Cline, and others; but scepticism or ridicule met him everywhere, and it was not till 1796 that he made the decisive experiment. On the 14th of May, a boy aged eight years was vaccinated with matter taken from the hands of a milkmaid; he passed through the disorder in a satisfactory manner, and was inoculated for small-pox on the 1st of July following without the least effect. Jenner then entered on an extensive series of experiments of the same kind, and in 1798 published his first memoir, 'An Enquiry into the Causes and Effects of the Variolæ Vaccinæ.' But success seemed uncertain till a year had passed, when upwards of seventy of the principal physicians and surgeons in London signed a declaration of their entire confidence in it. An attempt was then made to deprive Jenner of the merit of his discovery, but it signally failed, and scientific honours were bestowed upon him from all quarters. Grants of 10,000*l.* and 20,000*l.* were voted to him by the House of Commons in 1802 and 1807. He died Jan. 26, 1823.

The life of Jenner has been written by his friend Dr. Baron of Gloucester, in 2 vols. 8vo. Medals have been struck in his honour, and a statue has been erected to him in his native county.

JENYNS, SOAME, was born 1704, and died 1787. He was educated at St. John's College, Cambridge; he was M.P. for Cambridgeshire in 1741; for the borough of Dunwich in 1754; and for the town of Cambridge from 1761 to 1780. In 1755 he was made a lord of trade, and he held that office in spite of political changes until its abolition in 1780. His poems, which consist of 'The Art of Dancing,' 1728, and 'Miscellanies,' 1770, are included in the 2nd and 3rd editions of Johnson's 'Works of the English Poets.' His prose works are:—'A free Inquiry into the Nature and Origin of Evil,' 1756; 'View of the Internal Evidence of the Christian Religion,' 1776; 'Dissertations on various Subjects,' 1782. His works are collected in 4 vols. 8vo., 1790–3.

JERBOA. [Muridæ.]

JEREMIAH, one of the prophets of Judah, the writer of the book in the Hebrew canon which bears his name, and of that succeeding it in that canon, called 'The Lamentations.'

He was of the sacerdotal family, being the son of Hilkiah, a priest, whose residence was at Anathoth, a city of the tribe of Benjamin, about three miles north of Jerusalem. This we learn from the general title to his book of Prophecies (chap. i., ver. 1); and that title sets distinctly before us the period through which he flourished. He was called to the prophetic office, being then in his youth, in the thirteenth year of King Josiah, which, according to the received chronology, was 629 years before the Christian æra commences. He continued in the prophetic office till the eleventh year of King Zedekiah, that is, till 588 B.C. His contemporaries in the prophetic office were in the earlier periods Zephaniah and Habakkuk, and in the latter his æra approaches near to that of Ezekiel and Daniel.

The book entitled his Prophecies is a collection of such prophecies or exhortations as he delivered at various times, mingled with relations of historical events. The last chapter, the fifty-second, is wholly historical, and is supposed to have been written by some other person, not improbably Ezra, and to be intended as a kind of introduction to the book of 'Lamentations' which follows it. But the most remarkable circumstance relating to the composition of the book is this, that the various prophecies are put together without any regard to the order of time in which they were delivered. At the beginning we have the account of his call to the prophetic office, but we soon find prophecies delivered in the reign of Jehoiakim following others which were delivered many years after in the reign of Zedekiah. Jeremiah seems to have employed Baruch, his uncle's son, in committing his prophecies to writing.

The sacred books contain no later information concerning the prophet than that he was among those who went to Taphanhes. But some of the early Christian writers relate of him that he was stoned to death by his countrymen in Egypt for preaching against their idolatry.

JEREMIE, SIR JOHN, was born in Guernsey, August 19, 1795, and educated for the law, which he practised in Guernsey and before the Privy Council, and greatly distinguished himself. In 1824 he was appointed to the office of Chief Justice of St. Lucia, in the West Indies; in 1832 to that of Procureur and Advocate-General of the Mauritius; in 1836 he was made puisne justice of the Supreme Court of Ceylon; and in October 1840 he accepted the office of Governor and Captain-general of Sierra Leone and its dependencies, and he received at the same time the honour of knighthood. On the 23rd of April, 1841, only four months after his arrival at Sierra Leone, he fell a victim to the climate, while engaged in a mission at Port Lago. Sir J. Jeremie became an early and powerful supporter of Negro Emancipation, on which subject he published, in 1831, 'Four Essays on Colonial Slavery;' in 1833, 'Recent Events at the Mauritius,' and in 1840 a 'Letter on Negro Emancipation, and African Civilisation,' addressed to Sir J. F. Buxton. Sir J. Jeremie's opinions, which he faithfully and firmly adhered to, caused his appointment in the Mauritius to be so highly unpopular as to occasion almost an insurrection; in every other place his talents and character gained him general esteem.

JERICHO. [Syria.]

JERICHO, ROSE OF, is the popular name of a plant called by botanists *Anastatica Hierochuntica*. It is a native of Palestine and other parts of the East.

JEROME, SAINT, accounted the most learned of all the Latin Fathers of the Church, was born about A.D. 340, and died in 420. He was a native of Pannonia, but came early to Rome, where he studied under the grammarian Donatus. He visited Gaul, where he remained some time, and afterwards travelled in Thrace, Pontus, Bithynia, Galatia, and Cappadocia. He also visited Jerusalem. In A.D. 382 he returned to Rome

having spent some time at Constantinople on his way. At Rome he became secretary to Pope Damasus. He eventually returned to the neighbourhood of Jerusalem, and took up his abode in a monastery at Bethlehem, and here it is believed that he died.

Many of the writings of Jerome are come down to us. Amongst the most valuable are, his treatise on the 'Lives and Writings of the elder Christian Fathers,' and his 'Commentaries on the Prophetical Books of the Old Testament,' on the Gospel of St. Matthew, and on several of St. Paul's Epistles. But his greatest work is a translation of the books of both the Old and New Testament into Latin, which translation has been always highly valued in the Latin Church, and is that known by the name of the Vulgate.

JERSEY, an island in the English Channel, about 18 miles S.E. from Guernsey, between 49° 9′ and 49° 16′ N. lat., and 1° 58′ and 2° 14′ W. long. Its greatest length E. to W. is about 12 miles; its greatest breadth N. to S. is about 7 miles. The area is about 62½ square miles. The population in 1841 was 47,544.

The surface of the island has a gradual slope from north to south. On the north side the coast is abrupt, rising to the height of 100 to 200 feet, and broken by a succession of small bays and coves. The coast on the remaining sides is less precipitous. There are several good bays, the chief being Boulay, St. Catherine, Grouville, St. Ouen, St. Aubin, and St. Brelade. Groups of rocks surround the island at various distances from it, and there are also many banks and shoals.

The surface is everywhere undulating. The valleys generally run from north to south; they are narrow at the north end, where the high ground forms an almost unbroken hill, and grow wider as they approach the southern coast, where they expand into several flats of good pasture land. The principal water-courses flow from north to south.

The high land consists for the most part of granitic rocks; the southern part of a mass of schistose rocks incumbent upon granite. The roads are numerous, wide, and well constructed, and traverse the island in many directions.

The climate of Jersey, from its insular situation, is milder than that of other places under the same latitude, and the mean annual temperature is higher than that of any part of England. The agriculture is backward, which is partly owing to the minute subdivision of property, arising from the custom of gavelkind. Wheat is the principal grain crop; barley is grown, and some oats; parsnips are extensively grown and used for fattening hogs and bullocks. Potatoes for exportation are widely and increasingly cultivated. Lucerne is one of the most valued crops. A considerable portion of the land is laid out in orchards. Cows are very carefully reared; but sheep and horses are comparatively neglected.

Jersey is divided into 12 parishes. The parishes are subdivided into 'vintaines' (scores), supposed to be so called from having originally contained 20 houses. Of these vintaines there are from two to six in each parish, and in all 52.

There are three towns in the island, St. Helier and St. Aubin, both on the Bay of St. Aubin, and Gorey, on the east coast. *St. Aubin* is situated in the western angle of St. Aubin's Bay, 4¾ miles from St. Helier. The town consists chiefly of one street of about 60 houses, with about as many more in different directions. There is a good pier, but the depth of water is not sufficient for large vessels. The town is defended by a small fortress, which is insulated at high water. *St. Helier* is toward the south-east point of St. Aubin's Bay, and fronts the sea. In external appearance it is much on a level with English country towns of the same size, except that the ramparts of Fort Regent, overtopping the buildings, give to the place the appearance of a continental town. The principal public buildings are—the old church, two of the chapels, the theatre, and the gaol. There are two fortresses: Elizabeth Castle on a rock in the bay opposite the town, and Fort Regent, a strong fortification, commanding the town, of considerable strength, but inadequate accommodation. The population of the town in 1841 was 21,040. The harbour is formed by two piers, jutting out into the bay, at the south end of the town.

Gorey is situated on Grouville Bay. The importance of Gorey depends on its oyster fishery, in which upwards of 250 boats are employed. In the neighbourhood of Gorey is Mont Orgueil Castle, once the principal fortress of the island, on a headland between St. Catherine's Bay and Grouville Bay.

The other places in the island are mere hamlets, grouped round the churches of the several parishes, or scattered along the coast. Much of what has been said of the state of society and the constitution of the local government in Guernsey will apply to Jersey. [GUERNSEY.] The states of Jersey consist of the governor and the bailiff of the royal court, both appointed by the crown; the 12 judges of the royal court, elected to office for life by the suffrage of the ratepayers; the rectors of the parishes, appointed to their livings by the governor; and the 12 constables elected every three years, one for each parish, by the inhabitants. The officers of the crown have seat and can speak, but not vote.

The trade of Jersey, owing to the privileges possessed by the islanders, is very considerable. The agricultural produce of the island, potatoes, apples, cider, butter, cows, and other live stock are sent to England; the articles required for the consumption of the island are in a considerable degree supplied from France.

Jersey, the *Cæsarea* of the Romans, is said to have been originally called Augia. In the reign of Edward III. this island was attacked by Du Guesclin, constable of France, but the arrival of succours from England prevented him from proceeding. In December 1780, the Baron de Rullecourt landed with 700 men, took possession of St. Helier, and made the lieutenant-governor, Major Corbet, prisoner, and induced him to sign a capitulation. The British troops and island militia, under Major Pierson, next in command, refused to recognise the capitulation, and, att

ing the French, killed Rullecourt, with the greater part of his men, and obliged the rest to surrender. Major Pierson fell in the beginning of the attack.

JERSEY, NEW. [NEW JERSEY.]

JERUSALEM (in Hebrew *Yerushalami* and *Yerushalaim*, in Greek and Latin *Hierosólyma*, in Arabic *El-Kuds*, in Turkish *Koudsi-Cherif*), the chief city of Palestine, in Syria, is situated in 31° 47′ N. lat., 35° 19′ E. long., 38 miles E. from the Mediterranean, and 27 miles W. from the entrance of the Jordan into the Dead Sea. The site of Jerusalem is an elevated piece of ground, separated, except towards the north, by valleys and ravines from hills that inclose it. The inclosed platform extends about 1800 yards from N. to S., and (in the widest part) 1100 yards from E. to W.: it has a general slope from W. to E., so that the town is fully displayed, like a panorama, to those who view it from the east. The surface of the platform is uneven, and ends southwards in Mount Zion, which is excluded from the modern city. The other eminences of the platform, such as Mount Moriah (on which the Temple stood), and Mount Acra, are now scarcely distinguishable as elevations, probably from the gradual filling up of the interjacent valleys. To the east of the city lies the Valley of Jehoshaphat, through which lies the course of the torrent Kedron. Beyond it rises a group of hills, of which the Mount of Olives is the principal. The southern valley is a rocky ravine, and appears to have been anciently quarried to supply stone for the buildings of the city. Beyond this valley rises a broad and barren hill. The Valley of Gihon or Rephaim, on the western side of the city, is bounded by a rocky flat, which terminates to the northward in the elevation called Mount Gihon.

Of the ancient Jewish city some substructions, the sepulchral excavations in the neighbouring cliffs, and perhaps the tombs of Absalom and Zachariah, in the Valley of Jehoshaphat, are the only remains that can now be recognised. There is scarcely any incident mentioned in Scripture however, as connected with Jerusalem and its neighbourhood, of which the site is not very distinctly pointed out.

On the site of Solomon's temple the Moslems have built the mosque of the Khalif Omar, which is an octangular structure surmounted by a dome, and stands upon an elevated platform paved with polished marble, in the midst of a grand quadrangle (1489 feet by 995), which contains at its southern extremity the mosque of El-Aksa, originally a Christian church. But to the thousands of Christian pilgrims who yearly visit Jerusalem the great object of interest is the church of the Holy Sepulchre founded by the Empress Helena, to recover which from the infidels was the object of the CRUSADES. This church was destroyed by fire in 1811, and rebuilt in 1812. It comprehends Mount Calvary and the whole locality connected with the crucifixion, death, and burial of our Saviour.

Jerusalem, as a whole, is still a respectable-looking town. It is of an irregular shape, approaching nearest to that of a square, and is surrounded by a high embattled wall, built of the common stone of the country—a compact limestone. It has seven gates, and is about 2½ miles in circumference. The population of the city, not including pilgrims, is about 12,000, one-third of whom are Jews, rather less than one-third Christians, and the rest Moslems. The first Protestant bishop of Jerusalem (Alexander) was appointed in 1841. The appointment to this see is vested in the crowns of England and Prussia alternately.

For particular details of the history of the city, and of its disastrous siege and capture by Titus, reference is given to Josephus's History, Knight's *Pictorial Bible*, the Travels of Clarke, Buckingham, Richardson, and Niebuhr.

JERVAS, CHARLES, a portrait-painter, was born in Ireland about 1675. He studied with Kneller in London, and also in Paris and at Rome. He returned to London about 1708, where, through the praise and friendship of Pope, he was much employed, though his chief ability as a painter seems to have been his skill in copying: some of his copies after Carlo Maratta are, according to Walpole, equal to the originals. Jervas died Nov. 2, 1739.

JERVIS, JOHN, earl of St. Vincent, was born at Meaford in Staffordshire, Jan. 9, 1734, O.S.; entered the navy at ten years old; rose to be captain; fought in Keppel's action in 1778; and captured the Pegasé, French 74, in 1782, for which he received the order of the Bath. On the breaking out of the French revolutionary war, he sailed in command of a squadron to reduce the French West India Islands, and captured Martinique, Guadaloupe, and St. Lucia. He was promoted to be Admiral of the Blue, June 1, 1795, and in the autumn took command of the Mediterranean fleet, with which he intercepted and defeated the Spanish fleet off Cape St. Vincent, on Feb. 14, 1797, for which he received the thanks of both houses of parliament, and was raised to the peerage by the title of Earl of St. Vincent and Baron Jervis of Meaford, and received a pension of 3000*l*. In 1798 the mutiny which broke out in the Channel fleet spread to the Mediterranean fleet, but was suppressed by his judicious and decisive severity. In 1801 he was made first Lord of the Admiralty on the formation of the Addington ministry, and at once set vigorously to cut down extravagant expenditure and to reform abuses. On Mr. Pitt's return to office, in May 1804, he placed Viscount Melville at the head of the Admiralty. Earl St. Vincent again took command of the Channel fleet in 1806, in Fox's administration, but held it only for a year. He was appointed admiral of the fleet on the day of George IV.'s coronation, July 19, 1821, and died March 15, 1823, in the 90th year of his age. A monument has been erected in honour of him in St. Paul's Cathedral.

JESUITS, SOCIETAS JESU, is the name of a celebrated religious order which was formed towards the middle of the sixteenth century. Ignatius or Iñigo Loyala was a Biscayan officer of noble birth, in the Spanish army, at the beginning of the reign of Charles V. Being wounded in the defence of Pamplona, then besieged by the French and the Navarrese, he underwent a long

and tedious confinement. Loyola was a man of enthusiastic mind; he had been fond of the world, and devoted to gallantry and pleasure; but now he resolved to devote himself to a life of piety and religious labour, and conceived the plan of establishing a religious order, which should be entirely devoted to the following objects: 1. The education of youth. 2. Preaching and otherwise instructing grown-up people. 3. Defending the Catholic faith against heretics and unbelievers. 4. Propagating Christianity among the heathens and other infidels by means of missionaries. Ignatius, having promulgated his views, procured some associates, and, after overcoming many impediments he with his friends repaired to Rome in 1537, wher ne laid before Pope Paul III. an outline of the institutions and regulations of his intended order. Loyala had been a military man, and he based his rules upon the principles of a strict subordination, carried through several gradations, terminating with the præpositus generalis, or general superior, who was to have absolute sway over the whole society, and from whose decisions there was to be no appeal. The general was to be subject to the Pope only. Pope Paul III. approved of the plan, and it was decided that the new order should be called the Society of Jesus, that the members should wear no monkish garb, but dress in black, like the secular priests, and should in fact differ essentially from the monastic orders then existing. The bull of the Pope authorising the new Society was issued in 1540. The original 'Constitutiones' of Ignatius were written in Spanish, but afterwards translated into Latin. The first edition of them appeared at Rome, 'Constitutiones Societatis Jesu,' 1558, after the death of the founder, who expired on the 31st July, 1556. At his death the Society was already established in Italy, Spain, Portugal, and Germany, and had above one hundred schools, besides numerous missionaries in the East and in Africa and America. Ignatius was succeeded as general of the Society by James Lainez, a man of more extensive information than his predecessor. It is to Lainez that the principal share in framing the 'Constitutiones' is attributed.

The Jesuits, very shortly after their establishment, began to play a distinguished part in the affairs of Europe. Lainez was sent by the Pope as his legate to the Council of Trent, and he was the opponent of Beza at the Conference of Poissy in 1561. Soon afterwards, notwithstanding the opposition of the University of Paris, they obtained permission from Francis II. to open colleges and schools in France. The Jesuits taught gratis, and the university, whose courses of lectures were paid for, was jealous of them, and attacked them repeatedly.

During the war of the League the Jesuits opposed the claims of Henri IV., as being a heretic; but on suspicion of having been accessary to two attempts which were made on his life, the Parliament of Paris decreed their banishment in 1594; but in 1603 Henri IV. recalled them.

The missions of the Jesuits also form an important part of the history of their Society. The first attempts by Xavier in India were premature, but he served as a pioneer to prepare the way fo others better qualified for the task, and the Jesuit formed in time numerous Christian congregation in Japan. The history of the Japanese Christian and their extermination in 1637, is found in Ba toli, 'Historia della Compagnia di Gesu,' ' Giappone, seconda parte dell' Asia.' In Chir the Jesuits were likewise successful, and the establishment there has been more durable. A though persecutions broke out against the Christian in China, yet the Jesuits never entirely lost the hold there. In Paraguay the Jesuits had an ope field for the display of their abilities and principle They formed, on the banks of the Paraguay an the Parana, a flourishing community of India converts, who are said to have amounted to mo than 100,000, and they governed them for a centu and a half in peace and happiness; but in 175 an attempted transference of the sovereignty the territory from Spain to Portugal led to a order from the government of Spain that th Jesuits and their Indian pupils should abando their homes, and remove to some other part of th Spanish territories. The Jesuits were prepared obey, but the natives refused to submit, and r sisted the Portuguese and Spanish forces whic were sent against them; and, although a subsequen change in the diplomatic relations of the tw countries left the Indians in possession of the country, yet the Jesuits were falsely accused having encouraged what was styled the rebellio This and some other causes of offence occasion the Portuguese minister Pombal, in 1759, to iss an order for the expulsion of the Society from t Portuguese territories, and for the confiscation their property. The order was executed with t greatest inhumanity both in Portugal and Bra

France followed next in the same course proscription. The Jesuits had from various reas become unpopular with the people, the parliam and the minister Choiseul; but the enmity Madame de Pompadour was productive of m serious consequences. Pretences were easily fou and in 1764, by an order of the king, the Soci was entirely suppressed in France, and their p perty was confiscated; but a small pension given to the members, who were allowed to re dispersed in the country, on condition of swea to renounce the Society and its institutions.

Their fall in Spain took place three years l Choiseul is said to have contributed to it by suading Charles III. that an insurrection w broke out in Madrid in 1766 was the wor the Jesuits. On the 31st of March, 1767, colleges and houses of the Jesuits throug Spain were surrounded at midnight by tr sentinels were posted at every door, the were secured, and the king's commissioners, ha roused and assembled the respective commu in the refectory, read to them aloud the decree which expelled them from Spain. were placed in carriages and escorted by ca to the coast, where they embarked for After being refused admittance into several bours, and kept for some months on board cro ships, during which many of the aged and i died, the survivors were at last landed in C

In the following year, 1768, the King of the Two Sicilies and the Duke of Parma suppressed the Jesuits' Society in their dominions. It still continued in the Sardinian and the Papal States; but on the 21st July, 1773, the Pope (Ganganelli) issued a bull declaring the said Society to be suppressed and extinct.

In consequence of this bull, the Jesuits were likewise suppressed in the Sardinian monarchy, in the Austrian dominions, and in every Catholic state. Two powers only, Prussia and Russia, one Protestant and the other Greek schismatic, allowed the fathers an asylum, and continued to intrust them with the education of their Catholic subjects.

After the Society had been suppressed for about 30 years, several attempts were made at the beginning of the present century to re-establish it. In 1801, Pius VII. issued a brief, allowing the Jesuits of Russia to live as a Society, and to have colleges and schools. Another brief, dated 30th July, 1804, allowed, at the request of King Ferdinand of Naples, the opening of schools and colleges by the Jesuits in the kingdom of the Two Sicilies. Lastly, after his restoration, Pius VII. issued a bull in August 1814, solemnly re-establishing the Society as a religious order, under the constitutions of St. Ignatius. In France they had reintroduced themselves in a kind of clandestine manner after the Restoration, upon which a great outcry was raised, and they were finally expelled in 1830.

In Russia the Jesuits were expelled by a ukase of the Emperor Alexander, in June 1817, upon the charge of intriguing and of making proselytes among the members of the established Greek Church.

The Act of the 10th Geo. IV. c. 7, which is entitled 'An Act for the Relief of his Majesty's Roman Catholic subjects,' forbids Jesuits, or members of other religious orders, communities, or societies of the Church of Rome, from coming into the realm, under pain of being banished from it for life; except natural born subjects, who were out of the realm at the time of the passing of the act. Such religious persons may however enter the United Kingdom on obtaining a licence in writing from one of the principal secretaries of state, who is a Protestant, and may stay such time as such secretary shall permit, not exceeding six months, unless the licence is revoked before the end of the six months. The act also makes it a misdemeanour in any Jesuit, or member of other religious body, to admit, or to aid in or consent to the admission of, any person within the United Kingdom to be a member of such body; and any person admitted or becoming a Jesuit, or member of other such body within the United Kingdom, shall, upon conviction, be banished from the United Kingdom for life. It is however provided that nothing in this act shall affect any religious order, community, or establishment, consisting of females bound by religious or monastic vows.

JESSULMIR. [RAJPOOTANA.]

JESUS, called the CHRIST, was born at Bethlehem, a city of Judæa, in the days of King Herod. The first chapter of St. Matthew contains the genealogy of Jesus deduced from Abraham through David to his reputed father Joseph: the third chapter of St. Luke contains his pedigree from Joseph to Adam. From Joseph to David, the two genealogies are entirely different; but this discrepancy is satisfactorily explained by the commentators. The birth of Jesus was miraculous: 'When his mother Mary (according to the words of St. Matthew) was espoused to Joseph, before they came together, she was found with child of the Holy Ghost.' Joseph, who intended to put her away privately, being warned in a dream by the angel of the Lord that what was 'conceived in her was of the Holy Ghost, took unto him his wife, and knew her not till she had brought forth her first-born son: and he called his name Jesus.' (Matt. i.) Herod was much troubled at the miraculous circumstances which attended the birth of Christ, and at the coincidence of the place of his birth with the prophecies. In order therefore that the infant might with certainty be destroyed, he gave orders that all the male children in Bethlehem and the neighbourhood under two years of age should be put to death; but Jesus was saved by his parents, who were warned by an angel in a dream to take the child into Egypt. This part of the sacred history is recorded by St. Matthew only. According to St. Luke, when the days of the purification of Mary were accomplished, his parents took Jesus from Bethlehem to Jerusalem, to present him in the Temple, after which they returned to their own city Nazareth in Galilee. At twelve years of age Christ disputed with the Jewish doctors in the Temple at Jerusalem, whom he astonished by his answers and his understanding. Towards his parents his conduct was an example of filial obedience. He was not above following the business of his reputed father, which was that of a carpenter, and until about his thirtieth year he fulfilled the common duties of life in an humble and obscure station. His public ministry was preceded by the warnings and admonitions of John the Baptist, the son of a Jewish priest, who called upon the people to repent and believe, for the time was fulfilled, and the kingdom of God was at hand. Christ was baptized by John in the river Jordan, and shortly after commenced his ministry, being about thirty years of age. For about the space of three years he was engaged in promulgating his doctrines, and confirming his divine mission by numerous miracles. In order to diffuse that religion which he came to make known, Christ selected a certain number of persons to be his constant companions, to learn his doctrines, to witness their influence, to testify to the miracles by which their truth was demonstrated, and to be prepared to propagate after his death the truths which he had made known. The twelve persons whom he chose are called the Twelve Apostles. They were ignorant persons, who possessed neither wealth, rank, nor education, and yet they were called to root out opinions which were deeply implanted in men's minds, and to overturn systems strengthened by all the influence which ancient and venerable authorities exert over the mind. Christ next appointed

from among his followers seventy disciples, whom he sent by twos to every place which he himself intended to visit. (Luke x. 1.) This appointment of the seventy disciples is not mentioned by the other evangelists. Many of the Jews, being convinced by Christ's preaching, and the miracles which he wrought among them, of his divine mission, the Jewish priesthood were alarmed, and sought some means of accomplishing his death. Being betrayed by Judas, one of the twelve whom he had chosen, Christ was taken before the Jewish court of the Sanhedrim, which had the cognisance of offences against religion, and from thence to the tribunal of Pontius Pilate, the Roman procurator or administrator of the revenues of the province. Before the Jews he was accused of blasphemy—a charge which was supported by two false witnesses; and before Pilate as a seditious person, and a stirrer up of disaffection,—a charge which was totally without foundation. But the Jews clamoured for his death; and, though Pilate saw nothing in the accusations brought against him worthy of capital punishment, he was sentenced to death in compliance with the clamour of the people, and apparently also from fear of some disturbance. In the midst of their scoffing and jeers he was led to the place of execution, and crucified, with circumstances of the greatest cruelty, between two criminals. On the third day Christ rose from the grave, according to his own prediction (Mark x. 34), and during forty days previous to his ascension into heaven he appeared among his disciples, whom he instructed more fully concerning the nature of his mission, which he now left in their hands. Fifty days after his ascension, the disciples, being assembled in Jerusalem at the feast of Pentecost (Acts ii.), were suddenly 'all filled with the Holy Ghost,' and endowed with the gift of speaking all languages. On this occasion three thousand persons were converted and received baptism. Being thus fitted for disseminating the principles of the new religion, the apostles and disciples whom Christ had appointed scattered themselves throughout various countries, but principally in the east. Matthias had been chosen to supply the place of Judas, the traitor, and an additional disciple, named Saul, afterwards Paul, a person of education, and, though a Jew, a Roman citizen of Tarsus, was especially called to co-operate with them.

The history of Christ has been written by four different individuals, whose accounts are received by Christians; and some of the arguments for the credibility of their testimony are founded upon the mode in which they accomplished their task. Matthew, who had been a collector of customs, wrote his Gospel in Hebrew for the use of the Jews soon after Christ's death; Mark is believed to have written under the direction of Peter, for the use of the Christians at Rome; Luke, whose gospel was written for the heathen converts, was a physician, a companion in the labours of St. Paul, and is supposed to have written his account of Christ while travelling with the apostle; John's gospel was written after all the preceding, and notices some circumstances which the other evangelists had passed over. That part of the New Testament which follows the four gospels was also written by St. Luke, and gives the Acts of the Apostles, and the history of Christianity, for about thirty years after Christ's death.

JESUS, son of Sirach, was a learned Jew of Jerusalem, who employed himself in collecting sayings of wise men, from which, with additions of his own, he formed the book of ECCLESIASTICUS. ('Ecclesiasticus,' i. 27.) We know little of him but what we can gather from that book, which was probably composed about 180 B.C.

Another Jesus, grandson of the former, translated the book of Ecclesiasticus into Greek, probably about 130 B.C.

JESUS COLLEGE, CAMBRIDGE, was founded in 1496, by John Alcock, bishop of Ely, who had obtained from King Henry VII. a grant of the nunnery of St. Radegund, then lately suppressed. It has 16 foundation fellowships, open to natives of England and Wales, without any restriction or appropriation whatsoever. Various scholarships, exhibitions, and smaller foundations, of different annual values, have been bestowed on this college from time to time by different benefactors. The buildings consist of two courts situated in the eastern part of the town. One of the courts is small, very ancient, and surrounded by a cloister. In 1848 the members of the senate were 115, the undergraduates 50, and the members on the boards 205.

JESUS COLLEGE, OXFORD, owes its foundation to the zeal of Hugh ap Rice, or Price, a native of Brecknock, who meditated the establishment of a college which should extend the benefits of learning to the natives of Wales. Queen Elizabeth, on his petition, granted a charter of foundation, dated June 27, 1571, the society to consist of a principal, 8 fellows, and 8 scholars. The society at present consists of a principal, 19 fellows, and 18 scholars. Several exhibitions have likewise been founded by different benefactors. The college buildings consist of two quadrangles, of which the inner was completed in 1676. In January 1848, the members of convocation were 68, and the members on the books 145.

JETHOU. [GUERNSEY.]

JETSAM. [FLOTSAM.]

JEWELL, JOHN, was born in Devonshire in 1522. He was entered at Merton College, Oxford, at the age of thirteen, and when eighteen he was admitted B.A., and became a college tutor. After the death of Henry VIII. Jewell declared himself openly a zealous Protestant. In the reign of Mary, he joined the English exiles at Frankfort, and afterwards at Strasburg, where he assisted Peter Martyr in the composition of some of his works. With the accession of Elizabeth came brighter prospects. Jewell returned home, and was almost immediately made Bishop of Salisbury. His zeal was not diminished. He continued both by his preaching and his writing to promote the doctrines of the Reformation. He died, in 1571, at the little village of Monkton Farleigh, in Wiltshire.

The writings of Bishop Jewell are chiefly c

troversial, the most remarkable of them being his 'Apology for the Church of England,' and his various Defences of that Apology.

JEWELLING OF WATCHES is the art of setting diamonds, rubies, sapphires, chrysolites, or other hard stones, in the frame-plates and other parts of watches, in such a manner that the pivots of the watch may act in holes made in these stones. The province of the watch-jeweller is to select the stones, and, except in the case of diamonds, to grind, polish, turn, drill, and set them into the frames or other parts of the watch in such a manner that the holes in the stones may correspond exactly in position with holes previously made by the watch-finisher or escapement-maker. Jewelling is an operation which, when well performed, adds materially to the durability, and not a little to the elegance of the machine. The apparatus necessary for the jeweller to carry on his business are, a small lathe; small gravers for turning brass and steel; a quantity of rough diamond in fragments, technically termed *bort;* small mills or circular disks of metal (usually copper) for grinding the stones into shape; diamond-powder of various degrees of fineness for polishing; and turning tools, made by cementing small pieces of bort into a notch made in the end of small brass wires and fixed in proper handles.

JEW'S-HARP, a musical instrument of the simplest and rudest kind, consisting of an iron frame, resembling in form the handle part of an old-fashioned corkscrew, in the centre of the upper and wide part of which is riveted at one end an elastic steel tongue, the extremity of which, at the free end, is bent outwards to a right angle, so as to allow the finger easily to strike it when the instrument is placed to the mouth and firmly supported by the pressure of the parallel extremities of the frame against the teeth.

JEWS (Ἰουδαῖοι and *Judæi* in Greek and in Latin), in its widest acceptation, is used as synonymous with Hebrews, or Israelites, but in a more restricted sense it means the inhabitants of the kingdom of Judæa as it existed in the time of Jesus Christ, and whose descendants are now scattered over the world. Their ancestor Abraham, called 'the Hebrew,' by birth a Chaldæan, emigrated, about 1921 years B.C., with his wife Sarai, his nephew Lot, and his servants and flocks, to the land of Canaan, the modern Palestine, where he settled. [ABRAHAM.] At an advanced age his wife bore him a son, Isaac, from whom the Hebrews are descended. Abraham's elder son Ishmael, whose mother was an Egyptian and a slave, settled in the wilderness of Arabia. Isaac married Rebecca, by whom he had two sons, Esau and Jacob, the former of whom was a hunter, and gave up his birthright to his younger brother Jacob. Jacob, surnamed Israel, or 'the strong' (Genesis xxxii. 28), had twelve sons, namely Reuben, Simeon, Levi, Judah, Dan, Naphtali, Gad, Asher, Issachar, Zabulon, Joseph, and Benjamin. From these were descended the twelve tribes of Israel, or of the Hebrew nation.

One tribe, the descendants of Levi, was set apart for religious service. Out of this class the officiating priesthood was chosen, as well as the scribes and keepers of records, the judges, and perhaps also the physicians.

The history of this people previous to the time of Christ is contained in the Old Testament and in Josephus.

To the Asmonæan dynasty [ASMONÆANS] succeeded that founded by Herod the Great [HEROD], under whom Christ was born. These kings, dependent on Rome for support, were in fact no more than Roman officers. Under Herod Agrippa a succession of more than usually rapacious Roman governors, Felix, Albinus, and Florus, drove the people into insurrection, and led the way to an open revolt against the Romans. A party called the Zealots, or fanatics, now obtained the ascendancy over the minds of the people, and the feeble Roman garrison was overpowered and massacred. At the same time the Greeks of Cæsarea massacred all the Jews in that city, and the Roman governor Florus took no notice of the transaction. Other cities of Palestine and Syria followed the example of Cæsarea by a wholesale butchery of the Jews. The Jews retaliated in those towns of Palestine where they were the majority by murdering the Syrians and Greeks. The Romans advanced against Jerusalem, and were repulsed, but Vespasian, an officer of tried abilities, was sent by the emperor Nero into Syria, A.D. 66-7. Vespasian assembled his forces at Ptolemais, where he was joined by Agrippa and by his own son Titus. His army, including auxiliaries, amounted to 60,000 men. For one year he employed himself in scouring the country and reducing the strongholds of the Jews. In the following year, A.D. 68, Nero's death gave the Jews a respite of nearly two years, during which however the inhabitants destroyed each other through intestine factions. At last Vespasian was proclaimed emperor; and, Vitellius being defeated, he entered Rome. His son Titus was left behind to complete the subjugation of Palestine. The regular siege began in the spring of A.D. 70, and it lasted till the following September, when Jerusalem was finally taken and totally destroyed, with its temple: the inhabitants were killed or sold for slaves. Still the Jewish population was by no means extirpated from the country, and we find them rising in vast numbers in the reign of Hadrian, and again engaging the Roman legions commanded by Severus. They were however overpowered with immense slaughter, and the second desolation of Judæa, took place. [BARCOCHEBAS; HADRIAN.]

The dispersion of the Jews over the world, which is commonly dated from the destruction of Jerusalem, had in reality begun long before. The Ptolemies had transplanted large colonies of them into Egypt, Cyrene, and Cyprus; and Antiochus the Great settled great numbers in the towns of Asia. In the time of Cicero ('Pro Flacco') there was a wealthy Jewish community in Italy. A passage of Philo, in his letter to Agrippa, enumerates the countries in which the Jews were settled in the time of Caligula: Egypt, Syria, Pamphylia, Cilicia, the greatest part of Asia Minor as far as Bithynia, the shores of the Euxine, Macedonia, Thessaly, Ætolia, Attica, the Peloponnesus, Cyprus, and Crete, besides the countries beyond the Euphrates.

Alternately persecuted and protected by the emperors, both of the West and of the East, the Jews by their commercial industry acquired wealth and importance when unmolested, and their numbers saved them from annihilation when in disfavour. But the rise of Mohammedanism brought an unfavourable change to the Eastern Jews. Mohammed endeavoured at first to win them over, but the Jews would not acknowledge a descendant of Hagar the bondwoman as the greatest of prophets, and Mohammed treated them without mercy in Arabia, where they were at that time numerous. But under the caliphs his successors they were protected on the easy terms of paying tribute; and, as they made no resistance, they experienced not only protection but even encouragement from their new masters, whom they followed through their tide of conquest along the coast of Northern Africa. They also contributed materially to the triumph of the Crescent in Spain, where the Jews had really a golden age, which lasted for some centuries. There they cultivated science and literature; and the names of Benjamin of Tudela, Isaac of Cordova, Hasdai, the confidant of Abderrahman, and many others, are examples of their proficiency. Rodriguez de Castro ('Bibliotheca Española') and Vicente Ximeno ('Escritores del Reyno de Valencia') give notices of the writings of the Spanish Jews. At the same time they were thriving in the East under the caliphs of Bagdad, whose favour they enjoyed, at least till towards the end of the tenth century.

Charlemagne protected the Jews like his other subjects: they filled municipal offices; they were physicians and bankers. The Jews enjoyed the same or even greater influence under Louis le Debonnaire and Charles the Bald, but towards the end of the latter reign the clergy began afresh to show their hostility. Philippe Auguste, pressed by the wants of an empty exchequer, and perhaps also by the reports of fanatics, who charged the Jews with all sorts of crimes, banished, A.D. 1180, all the Jews from his dominions, confiscated their property, and declared all debts due to them to be annulled. About twenty years afterwards the Jews were readmitted, but were again expelled under Charles VI.

In Italy the Jews seem to have enjoyed great though not uninterrupted security; but their safest asylum was Poland, where Casimir the Great allowed them considerable privileges, and where they formed the only middle order between the nobles and the serfs. It was in Spain and Portugal, after the expulsion of the Moors, that the proscription of the Jews was most sweeping and effectual. The number of Jews expelled from Spain has been vaguely estimated at half a million, and even 800,000. The expulsion of the Jews and that of the Moors or Moriscoes drained Spain of its most useful subjects.

Throughout the dominions of the Sultan the Jews were allowed to settle and follow their trades, though looked upon with scorn by the Osmanlees. In the regencies of Barbary they settled likewise in great numbers.

During the eighteenth century a milder spirit of toleration manifested itself towards the Jews in several countries of Europe. Maria Theresa and Joseph I. gave them equal rights, and subjected them to the same laws with the Christians. Frederic, called the Great, was not so liberal towards them, for he laid them under peculiar restrictions and disqualifications. In Holland they have long formed a highly flourishing, numerous, honourable, and intelligent community. Napoleon in 1806 issued an ordinance giving the Jews a regular organisation throughout France, and placing them on the same footing as other Frenchmen. This system has remained unaltered. The King of Prussia and other German powers have followed the example. In Russia the Jews are subject to many restrictions, and especially the Rabbins. In the United States of North America they are on the same footing as other citizens.

It does not appear at what time the Jews found their way to this island, but they were settled here in the Saxon period, and as early as A.D. 750. From the time of the Conquest the Jews in England rapidly increased in number. In the reign of Edward I., about A.D. 1290, all the Jews were banished from the kingdom. Their numbers at that time are conjectured (but on what grounds we are not aware) to have been between 15,000 and 16,000. It was not till after the Restoration, A.D. 1660, that the Jews again settled in England. In the year 1753 an act was passed to enable foreign Jews to be naturalised without taking the sacrament; but the act was repealed in the following session, under the influence of the popular feeling, which was most strongly opposed to the measure of 1753. The number of Jews in England and Wales in 1843 was about 18,700. The number in Scotland and Ireland is probably small.

During their residence in England, up to their banishment in the time of Edward I., the Jews were considered as the villeins and bondsmen of the king. The statute of the 54th and 55th of Henry III., which declared the Jews incapable of purchasing or taking a freehold interest in land, &c., and the Statutum de Judaismo, 3 Edward I., which forbade Jews from alienating in fee, either to Jew or Christian, any houses, rents, or tenements which they then had, or disposing of them in any way without the king's consent, &c., were repealed by the 9 & 10 Vict. c. 59. In 1845 an act was passed (8 & 9 Vict. c. 52), by which, instead of the declaration required to be made by 9 Geo. IV. c. 17, every person of the Jewish religion is permitted to make and subscribe another declaration, of which a form is given in the act, within one calendar month next before or upon his admission into the office of mayor, alderman, recorder, bailiff, common councilman, councillor, chamberlain, treasurer, town-clerk, or any other municipal office in any city, town corporate, borough, or cinque port within England and Wales or the town of Berwick-upon-Tweed. The declaration, instead of the words 'upon the true faith of a Christian,' runs in this form: 'I, A. B., being a person professing the Jewish religion, having conscientious scruples against subscribing the declaration contained in an act, &c. (referring to the 9 Geo. IV. c. 17), do

solemnly, sincerely, and truly declare, that,' &c. The abjuration oath, which contains the words 'upon the true faith of a Christian,' has the effect of excluding Jews from parliament. The 9 & 10 Vict. c. 59, s. 2, places Jews in respect to their schools, places for religious worship, education, and charitable purposes, and the property held therewith, on the same footing as Protestant dissenters from the Church of England. This act also repealed the Statute 1 Anne, c. 30, by which a Jewish parent could be compelled to maintain his Protestant children.

JHILUM. [HINDUSTAN.]

JIDDA. [ARABIA.]

JOAN, POPE, a supposed individual of the female sex, who is placed by several chroniclers in the series of popes between Leo IV. and Benedict III., about A.D. 853-5. David Blondel, a Protestant, completely refutes the story in his 'Familier Eclaircissement de la Question si une Femme a été assise au Siège Papal entre Leon IV. et Benoit III.,' Amsterdam, 1649.

JOAN I. of Naples, daughter of King Robert of Naples, of the Anjou dynasty, succeeded her father in 1343. She was then only sixteen years of age, but had been married some time to her cousin Andreas of Hungary. Andreas claimed to be crowned king and to share his wife's authority. A conspiracy was formed by some of the barons, and Andreas was strangled. There seems little or no doubt that Joan knew of the plot; but nevertheless, by her orders, torture was employed to find out the conspirators, and many persons were put to a cruel death. The same year Joan married her relative Louis, prince of Tarentum. Louis, king of Hungary, and brother of Andreas, came with an army to avenge his brother's death, but, Joan having been acquitted of the murder by Pope Clement VI., of whom she had demanded a trial, and a pestilence breaking out in Naples, the Hungarians withdrew, and Joan reigned many years in peace. Having lost her second husband in 1362, she married a prince of Majorca, and on his death she married, in 1376, Otho, duke of Brunswick. Having no children, she gave her niece Margaret in marriage to Charles, duke of Durazzo, and appointed him her successor. Soon afterwards the schism between Urban VI. and Clement VII. broke out, and Joan took part with the latter. Urban excommunicated her, and gave the investiture of the kingdom to Charles Durazzo, who revolted against his sovereign and benefactress, and took her prisoner. He tried to induce Joan to abdicate in his favour, but she firmly refused, and named as her successor Louis of Anjou, brother of Charles V., king of France. Charles then transferred Joan to the castle of Muro, in Basilicata, where he caused her to be strangled or smothered in her prison, in 1382.

JOAN II., daughter of Charles Durazzo, and sister of Ladislaus, king of Naples, succeeded the latter after his death in 1414. She was then forty-four years of age, and during her reign was governed by a succession of unworthy favourites. At one time she adopted Alfonso V. of Aragon and Sicily as her successor; but afterwards Louis of Anjou, grandson of the Louis to whom Joan I. had bequeathed the kingdom, was nominated by her. Louis of Anjou however died before Joan, who, on her death, appointed René of Anjou as her successor. She died in 1435, leaving her kingdom in great disorder, and with the prospect of a disputed succession and a civil war.

JOAN OF ARC. [ARC, JOAN OF.]

JOA'NES, or JUA'NES, VICENTE, a Spanish painter, was born at Fuente la Higuera in Valencia, in 1523. He studied in Italy, and chiefly the works of the Roman school. He died December 21, 1579, whilst engaged in finishing the altar-piece of the church of Bocairente. His best works are in the cathedral of Valencia, and there are several good specimens at Madrid.

JOANNINA, or JA'NINA, the capital of the Turkish province of Albania, and the residence of a pasha, is situated on the south-western shore of the Lake of Janina, in 39° 47′ N. lat., 20° 53′ E. long., and has about 10,000 inhabitants. It is supposed to stand on or near the site of the ancient Dodona. The city was taken in 1082 by the Normans, who under Bohemond, son of Robert Guiscard, defeated the Emperor Alexander Comnenus under its walls. In 1432 it fell into the hands of the Turks. An unsuccessful attempt made by the Albanian Greeks in 1611, to shake off the Turkish yoke, led to their expulsion from the old or fortified part of the town, and to the extension of the city along the shores of the lake on each side of the fortress. Janina was the capital of the famous Ali Pasha [ALI PASHA], under whom it contained 40,000 inhabitants, including the garrison, 16 mosques, 8 Greek churches, the seraglio and palaces of the pasha, the fortress mentioned above, and two others named Coulia and Litharitza. When Ali found himself no longer able to defend his capital against the Turks, he ordered it to be set on fire. So great was the destruction that followed, that, although some of the houses have been rebuilt, the city has still a deserted and ruined appearance. The house situated on the small island opposite to the peninsula on which the fortress stands still bears marks of the violence used in the murder of Ali. A British consular agent resides in Janina.

JOB, *the Book of*, is one of the poetical books of the Old Testament. Its title is taken from the patriarch Job, whose story it relates. Some critics have supposed, from the nature of the exordium, that Job was not a real person, and that the narrative in the book is fictitious. He appears however to be referred to as a real person by Ezekiel (xiv. 16), and James (v. 11); and the style of the book has all the circumstantiality of a real narrative. It has been inferred, from his longevity (xlii. 16), his holding the office of priest in his own family (i. 5), his allusion to no other species of idolatry than the worship of the heavenly bodies (xxxi. 26-28), the silence of the book respecting the history of the Israelites and the Mosaic laws, and several incidental allusions to patriarchal customs, that Job lived in the patriarchal age. The scene of the poem is laid in the 'land of Uz,' which, as Bishop Lowth has shown, is probably Idumæa. The language is Hebrew,

with a considerable admixture of Arabic, or, as others contend, of Aramaïc. The author is unknown. The canonical authority of the Book of Job is fully established by frequent quotations from it, both in the Old and New Testament.

JODE, DE, PIETER, the name of two celebrated engravers of Antwerp, father and son.

The elder, the son of Gerard de Jode, likewise an engraver, was born in 1570. He was the pupil of Golzius, studied and worked in Italy and at Paris, and died at Antwerp in 1634. He engraved among other plates that of the Last Judgment, by Cousin, in twelve sheets, about four feet square altogether: it is one of the largest prints in existence.

The younger De Jode was born at Antwerp in 1606. He worked with his father in Paris. His numerous portraits after Vandyck are his best works. Among them are his own, and those of Jordaens, Poelemburg, and others, painters of Antwerp. He executed also some good prints after Rubens. The date of his death is not known.

JOEL, one of the twelve minor Hebrew prophets. In the first verse of the first chapter of his prophecy we are told that he was the son of Pethuel. Beyond this we have no certain information respecting him. He prophesied in the kingdom of Judah, but in what reign is uncertain. The most probable opinion is that which places his prophecy in the reign of Uzziah, contemporary with Amos and Hosea, between 800 and 780 B.C. He appears to refer to the same events as Amos (compare Joel, i. with Amos, iv. 6-9, and Joel, ii. 4 6, with Amos, i. 9, 10); and he does not mention the Assyrians or the Babylonians among the enemies of Judah, but only Egypt and Edom (iii. 19). Other opinions have referred him to the reign of Joram (B.C. 895-883), and to that of Manasseh (B.C. 697-642). The canonical authority of this book has never been disputed.

JOHANNA. [Comoro Isles.]

JOHN, SAINT, *the Baptist*, son of Zachariah, a Jewish priest, and Elizabeth, his wife, who was a near relation of Mary, the mother of Jesus Christ, was born to them in their old age. The sacred office was assigned to him of being the precursor or herald of the Messiah. With the acts of John the Baptist begins the public ministry of Jesus Christ, who at his baptism was announced, both by the Baptist himself and by a voice from heaven, to be the Son of God, the Messiah.

From this time we hear little more of John till we find him in prison. He had ventured publicly to reprove Herod the king for an act of great immorality. Herod had married Herodias, who was the wife of Philip, tetrarch of Idumæa, his own brother. The Baptist's reproof was resented more violently by Herodias than by Herod, and at her instigation John was beheaded.

JOHN, SAINT, *the Apostle and Evangelist*. James and John, the sons of Zebedee, were both admitted by our Saviour into the number of his Twelve Apostles, and John was throughout distinguished by him with peculiar marks of regard, as we find in all the gospels.

After the resurrection of Jesus he was again distinguished by his notice: and when Jesus had ascended to heaven, and the interests of the Gospel were committed especially to those who had been chosen by him out of the world, John became one of the leading persons in the Church.

Saint John's labours in the Church were chiefly among the inhabitants of Syria and Asia Minor, and no doubt he had a large share in planting Christianity in those provinces, where for a time it flourished greatly. We have no particulars of his labours on which we can safely rely; but there is little reason to doubt that he was at one period of his life banished to the island of Patmos, and that there he wrote the book called the 'Apocalypse,' or 'Revelation.'

There are also preserved three Epistles of his: but the most valuable of his writings which have descended to our time is the 'Gospel according to Saint John.'

JOHN, ST., River. [Canada.]

JOHN, king of England, surnamed Sansterre, or Lackland, was the youngest son of Henry II., and was born at Oxford, December 24th, 1166. John married the youngest daughter of William, earl of Gloucester. In 1178 his father conferred upon him the dignity of Lord of Ireland; and in 1185 John went to take the government into his own hands; but the insolent demeanour of the prince and his attendants so disgusted the Irish, that his father found it necessary to recall him in the following December.

No opposition was offered by John to the accession of Richard, notwithstanding some expectations which he had of succeeding; but, when the intelligence of Richard's captivity arrived in 1193, John at once openly took steps for the usurpation of the throne. In this attempt, however, he was successfully resisted; and on the return of Richard to England, in March 1194, John's castles and estates were seized by the crown, and he fled to Normandy, whither he was followed by the king at the head of an army; but the traitor made his peace by an abject submission. It is said that Richard, when on his death-bed, was induced to declare John his successor.

John was present when Richard expired at Chaluz, 6th April, 1199, and before visiting England he hastened to secure the submission of the various continental territories of the crown. Meanwhile in England, by the activity of the justiciary Fitz-Peter, a unanimous resolution to receive him as king had been obtained from a great council held at Northampton. Soon after this, John made his appearance in person; and he was crowned at Westminster, on the 26th of May, the festival of the Ascension.

Philip Augustus of France having, for his own purposes, espoused the cause of Arthur (the son of Richard's elder brother Geoffrey), whom he had got into his possession, soon overran both Normandy and Anjou; but in May 1200, John purchased a peace. The next year John procured a divorce from his wife on the plea of consanguinity, and married Isabella, daughter of Aymar, count of Angoulême, who had already been betrothed, and even privately espoused, to Hugh, count of La

Marche. The complaints of the count gave Philip such a pretence as he wanted for renewing the war; and, again putting Arthur forward as the legitimate lord of the old fiefs of the Plantagenets, he rapidly obtained possession of all the most important towns and places of strength in those countries. Arthur, however, was taken captive by his uncle (August 1, 1202), immediately consigned to close custody in the castle of Falaise, whence he was removed to Rouen, and was universally believed to have been there put out of existence by his uncle's order. Notwithstanding the capture of Arthur, however, the war in France went wholly against John; and, before the end of the year 1204, Normandy, Anjou, Maine, and Touraine were rent from the crown of England, and reannexed to that of France. Two years afterwards John made an unsuccessful attempt to recover what he had thus lost.

While still at war with France, John became involved in another contest at home. By insisting upon the right of the crown to nominate the Archbishop of Canterbury, he drew upon himself the hostility of the whole body of the national clergy, and also of the Pope [INNOCENT III.], at whose instigation Philip Augustus prepared to invade England.

The ill success of an expedition against France induced John to make the most humiliating submissions to the Pope, to whom he surrendered his kingdom and paid homage and tribute. Philip, mortified by this pacification, would have persisted in his project of invasion but for the result of a battle fought in June 1213 between the English and French fleets, in the harbour of Damme, the first great victory in the naval annals of England, in which 300 of his vessels were captured, about 100 burned, and all Philip's military stores and provisions taken or destroyed. On the 19th October, 1214, a truce was arranged between the two kingdoms, to last for five years. But the depressed state of John's affairs now presented to his barons an opportunity for the renewal of demands which they had repeatedly made in vain. The result was the celebrated meeting on the plain of Runnymead, on Trinity Monday, June 15th, 1215, and the concession and signature of the Great Charter. [MAGNA CHARTA.] This was followed by fresh encounters with the barons, caused by John's endeavours to escape from the obligations of the Charter, which the Pope annulled at his request, excommunicating the barons and laying London under an interdict. John contrived to triumph not only over these adversaries, but also to defeat the King of Scotland, who had taken the opportunity to invade the kingdom. The barons, as a last resource, invited Louis the dauphin to accept the crown. Louis set sail from Calais with a fleet of six hundred and eighty sail, and, on May 30, 1216, landed at Sandwich, attacked and reduced the castle of Rochester, and immediately marched to the capital. The contest which followed seemed of doubtful issue; but on October 14th, as John was attempting to ford the Wash at low-water, from Cross-keys to the Fossdyke, and had already got across himself with the greater part of his army, the return of the tide suddenly swept away the carriages and horses that conveyed all his baggage and treasures; on which, in an agony of vexation, he proceeded to the Cistercian convent of Swineshead, and was that same night seized with a violent fever, which was attributed to poison. He was conveyed the next day in a litter to the castle of Sleaford, and thence to the castle of Newark, where he expired, October 18th, in the forty-ninth year of his age, and the seventeenth of his reign. He was succeeded by his son Henry. [HENRY III.]

JOHN OF GAUNT. [EDWARD III.]

JOHN OF SALISBURY finds a place in every catalogue of learned Englishmen. His æra was the reign of King Henry II. John had studied at Oxford, but he visited also the universities of France and Italy. He became bishop of Chartres in 1164, and died in 1182. His principal historical writings were Lives of two archbishops of Canterbury, Anselm and Thomas à Becket. But the work by which he is best known to scholars is entitled 'Policraticus, sive de Nugis Curialibum et Vestigiis Philosophorum,' in which he describes the manners of the great, speaking not unfrequently in a style of sharp satire. There is an edition of it, Paris, 1513, and another, London, 1595, and other editions. A large catalogue of his writings may be seen in Pitz and other writers of that class.

JOHN I.—XXIII. [POPE.]

JOHN'S COLLEGE, ST., OXFORD, was founded in 1555 by Sir Thomas White, Knt., alderman of London. It consists of a president, 50 fellows and scholars, 1 chaplain, 1 organist, 6 singing-men, 8 choristers, and 2 sextons. All the fellows, except six of the founder's kindred, and two from Coventry, two from Bristol, two from Reading, and one from Tunbridge schools, are elected from Merchant Taylors' School, London.

The buildings of St. John's College form chiefly two quadrangles, of which the first was originally St. Bernard's College, founded in the time of Henry VI. King Henry VIII. had granted these premises to Christ Church, Oxford, from which college Sir Thomas White purchased them in 1555. The second quadrangle was entirely built at the expense of Archbishop Laud. It was begun in 1631, and completed in 1635, from a design furnished by Inigo Jones.

In January 1848, the members of convocation were 164, and the members on the books 311.

JOHN'S COLLEGE, ST., CAMBRIDGE, was projected and begun by Margaret, countess of Richmond, a short time before her death, which happened in 1509. It was completed by her executors, under the authority of a papal bull and the royal mandates of her son and grandson, King Henry VII. and King Henry VIII., which gave them the power of suppressing a decayed hospital dedicated to St. John, at that time existing on the same site. The college, then consisting only of the present first court, was four years in building. The original endowment was for 50 fellows, but, part of the foundation-estates having been seized by King Henry VIII., the funds were found to be sufficient for 32 only. There are also 21 fellow-

ships founded by different benefactors, which have all the privileges of the former, and give an equal claim to the college patronage. There are numerous scholarships, exhibitions, &c.

The present buildings consist of the first court, a second court of large dimensions, and a third, which contains the library. A handsome new court has been built by Hickman on the opposite side of the river Cam, and is connected with the old buildings by a bridge.

This being a divinity college, all the fellows are obliged to take priest's orders within six years from the degree of M.A., except four.

In 1848 the members of the senate were 741, the undergraduates 347, and the members on the boards 1353.

JOHN'S, ST. [NEWFOUNDLAND.]

JOHN'S, ST. [NEW BRUNSWICK.]

JOHNSON, SAMUEL, the son of Michael Johnson, a bookseller at Lichfield, was born at Lichfield, Sept. 18, 1709. As a child he was afflicted with the king's evil, which disfigured his face and impaired his eyesight. His education was commenced at Lichfield, whence he was removed to a school at Stourbridge; and in 1728, two years after he had left Stourbridge, he was placed at Pembroke College, Oxford. His father was unable to continue to maintain him at college, and he was compelled to return to his father's house without having taken a degree. In the December following (1731) his father died in such pecuniary distress, that Johnson was soon afterwards glad to become usher of a school at Market Bosworth, in Leicestershire; but, finding the drudgery of this employment intolerable, he procured temporary employment in translating for a bookseller in Birmingham. During his residence in this town he became intimate with the family of a mercer named Porter, whose widow he subsequently married (1736). Mrs. Porter was more than twenty years older than himself, but he was much attached to her, and she added to other powers of increasing his happiness the possession of 800*l*. With this capital he established a school; but the scheme failed, and he left Staffordshire with his pupil Garrick to seek his fortune in the metropolis. He was employed by Cave the bookseller, the projector of the 'Gentleman's Magazine.' In 1738 he published his 'London,' an imitation of the third satire of Juvenal, for which Mr. Dodsley gave him ten guineas, and by which he obtained a certain degree of reputation. His pen was continually at work, and his pamphlets, prefaces, epitaphs, essays, and biographical memoirs were continually published by Cave, either by themselves or in the 'Gentleman's Magazine,' for which periodical in 1740, and for more than two years afterwards, he wrote the parliamentary debates. In 1744 he published his 'Life of Savage;' in the following year some observations on Shakspere, of whose plays he afterwards published an edition. In 1747 he commenced his 'English Dictionary,' which he engaged to complete in three years for 1575*l*. In 1749 appeared 'The Vanity of Human Wishes,' an imitation of the tenth satire of Juvenal; and in the following year was printed the first paper of the 'Rambler.' On the death of his wife in 1752, he relinquished the 'Rambler.' The 'Dictionary' was published in 1755, 2 vols. folio. In May, 1762, George III., through his minister Lord Bute, granted Johnson a pension of 300*l*. a year, and the days of his penury were at an end. He was introduced in the following year to his biographer Boswell, and we have from this date (1763) as full and minute an account of him as has ever been written of any individual. Boswell's 'Life of Samuel Johnson, LL.D.,' was published in 1791, 2 vols. 4to. Many editions have been since published, of which the latest is by Croker, 10 vols. 12mo.

In 1765 the University of Dublin sent over a diploma creating him a doctor of laws; but he did not assume the title of doctor until eight or ten years afterwards, when the University of Oxford conferred the same honour upon him.

In 1766 his friend Mr. Thrale received him into his house at Streatham. In the autumn of 1773 he made a tour, in company with Mr. Boswell, to the Western Islands of Scotland, of which he published an account. Two years afterwards he made a short excursion to Paris. The last of his literary labours was 'The Lives of the Poets,' 4 vols. 8vo., 1781. He died, Dec. 1784, at his house in Bolt-court, Fleet-street. He was buried in Westminster Abbey, near the foot of Shakspere's monument, and close to the grave of Garrick.

JOHNSTON, DR. ARTHUR, was born in Aberdeenshire, in 1587. He studied medicine on the Continent, resided for twenty years in France, returned to England some time before 1625, and was appointed physician to King Charles I. In 1641 he died at Oxford. Johnston was the most extensive contributor, and is not unusually called the editor, of Sir John Scot's collection of Latin poems, the 'Delitiæ Poetarum Scotorum hujus Ævi Illustrium,' Amsterdam, 1637, 2 vols. 12mo.; and, besides other compositions in Latin verse, he was bold enough to compete with Buchanan in a version of the Psalms, 'Paraphrasis Poetica Psalmorum Davidis,' Aberdeen, 1637, 8vo. This attempt led, many years afterwards, to a controversy on the merits of the rival versions. It is enough here to say, that Johnston's high rank among modern writers of Latin poetry is universally admitted.

JOIGNY. [YONNE.]

JOINERY (French, *Menuiserie*) is the art of joining pieces of wood together for the interior fittings of buildings, for making articles of furniture, and for numerous purposes requiring greater neatness of workmanship than the operations of the carpenter. As carpentry and joinery are in many cases carried on in the same establishment, and even by the same workmen, it would be difficult accurately to define the limits of these two kindred arts. The proper object of carpenter's work in a building is to give firmness and stability to the structure; and within its proper range may be embraced all the rough timber-work necessary for the support, division, or connection of the several parts of a building. Carpentry thus includes the construction of the framing of floors, partitions, and roofs. Joinery has for its object

the addition of all the fixed wood-work necessary for convenience or ornament. Cabinet-making, or that department of wood-work which relates to the making of furniture, has little affinity with joinery, although the same materials and tools are employed in both descriptions of work. The line of demarcation, however, between joinery and cabinet-making seems to be even more difficult to define than that between carpentry and joinery; and, with the exception of such matters as veneering and polishing, which relate only to the use of the harder and more valuable woods, the operations of the cabinet-maker and the joiner are nearly identical, the same means being adopted by both for the production of neat and strong joints, and for evading the injurious effects of shrinkage and warping in the material operated upon.

JOINT. [ARTICULATION.]

JOINT-HOOK. [BEVEL.]

JOINT-STOCK BANKS. All banks which have more than six partners are called Joint-Stock Banks, and were first allowed by 7 Geo. IV. c. 46, passed in 1826. The operations of the Bank of England are controlled by the 7 & 8 Vict. c. 32. [BANK.]

Private Banks.—By the 7 & 8 Vict. c. 98, no new bank of issue can henceforth be established in England, and only those bankers are now allowed to issue notes who were issuers on the 6th of May, 1844. The act contains other regulations as to private banks of issue, and requires among other things a weekly return to the Commissioners of Stamps.

Joint-Stock Banks.—Nearly twenty years elapsed, from the date of the act which allowed the establishment of Joint-Stock Banks, before a comprehensive act was passed 'to regulate joint-stock banks in England.' This is the Act 7 & 8 Vict. c. 113, which received the royal assent on the 5th of September, 1844. On the same day, another act (7 & 8 Vict. c. 111) received the royal assent, entitled 'An Act for facilitating the winding up the affairs of Joint-Stock Companies unable to meet their pecuniary engagements;' and s. 48 of 7 & 8 Vict. c. 113, enacts that every banking company of more than six persons in England shall be deemed a trading company within the provisions of this act. The Act 7 & 8 Vict. c. 110, for the 'registration, incorporation, and regulation of joint-stock companies,' does not apply to banking companies.

By the new act for regulating joint-stock banks, such of these banks as are already in existence may be remodelled under its provisions. Every new joint-stock bank, before it can commence business, is required to present a petition to her Majesty in council, signed by at least seven shareholders, praying for a grant of letters patent; and this petition must set forth certain matters which are required by the act. When joint-stock banks were first established, each shareholder was answerable to the extent of his whole property. By 1 Vict. c. 73, they were rendered liable only to the extent of their shares; but the liability did not extend to the shareholders as a body. By 7 & 8 Vict. c. 113, the liability of any shareholder extends equally to the whole body of shareholders as a company; but, if execution upon any judgment against the company shall be ineffectual to obtain satisfaction, then any shareholder may be proceeded against. The acts of an individual partner were formerly binding on all the other shareholders; but it is only the acts of an individual director or other officer properly appointed which are now binding on the co-partnership.

JOINT STOCK COMPANY. Joint stock companies are such companies as are unincorporated, and which trade upon a joint stock. All trading associations, however numerous, and although not established by charter or act of parliament, are legal, provided their purposes be legal, and provided they do not attempt to exercise the privileges of a corporation, such as the power of making their shares transferable at the will of the holder. The partners in joint-stock companies are of two classes: one consists of directors, trustees, and others, who are actively employed in conducting the concern; the other, of a number of persons who take little or no part in its management, and many of whom become shareholders for sake only of a profitable investment of their money. The general conduct of the trade falls upon the directors, while the more particular transactions are usually managed by paid agents who are not shareholders. The funds and other property of the company are vested in the trustees. The deed of settlement is a covenant made between a few of the shareholders, chosen as trustees for that purpose, and the others; by which each of the latter covenants with the trustees, and each of the trustees covenants with the rest of the shareholders, for the due performance of a series of articles which are specifically set forth, and which point out the duties of the trustees, directors, and auditors, define their powers, and all other necessary matters. In all matters which might have been provided for by the deed, but are not, the law of partnership prevails.

The private property, to its full extent, of every member of an unincorporated trading company is liable for the whole debts of the company. The most important object to be gained by an act of parliament for a joint-stock company is by the clause which enables it to sue and be sued through the medium of one of its officers; without which advantage the difficulties attendant upon suits by or against such companies are beyond calculation.

A partnership in the working of a mine is considered by courts of equity as a partnership in a trade, and therefore subject to the usual rules as to partnership.

The constitution and regulation of joint-stock companies have been more particularly defined by several recent statutes.

The Act 7 & 8 Vict. c. 110, applies to companies formed subsequent to 1st Nov., 1844, which consist of more than twenty-five members, provided they are not constituted by charter or by act of parliament. The most important feature of the act consists of provisions for subjecting joint stock companies to certain regulations while in their provisionary state, and before operations have been commenced. It is required that, before any public advertisement of an intended joint-

stock company be issued, the promoters are to effect a 'provisional registration' at an office established for the purpose; which registration must set forth the name and nature of the proposed company, the names, occupations, and places of abode, of the promoters and officers, the names of subscribers, with various other particulars; and copies of each prospectus must be deposited before being issued.

When the company is formed, a 'complete registration' is to be made, and until this is effected all their proceedings are of a provisionary character. The 'complete registration' is accomplished by sending in schedules which give full particulars respecting the constitution of the company. Every shareholder must enter into a covenant to pay up instalments; the deed is to be registered; accounts are to be audited, and balance-sheets made and produced to the shareholders, yearly, and the right of the shareholders to examine the books for a certain time must be granted. The balance-sheet and auditors' reports are also to be annually registered. The act imposes other conditions on joint-stock companies, amongst which are the following: Shareholders whose instalments are all paid, have a right to be present at all general meetings, and to take part in the discussions; to vote on any question, either in person or by proxy, unless the deed of settlement precludes proxies; and they have a vote in the choice of electors and auditors. Patrons and directors must hold shares in the company, under a penalty of 20*l*. A 'register of shareholders' is to be kept, which must show the number and amount of shares held by each shareholder: each shareholder has a right to inspect this register on demand; and he is entitled to a certificate of the number of shares which he holds, and the amount paid thereon, which certificate may be evidence in a court of law. When completely registered, shares may be transferred; but all the instalments due must first be paid up, and the transfer must be registered before the holder is entitled to share in the profits or to vote. The act contains a number of other regulations. The registrar of joint-stock companies is required to make an annual report, which is to be presented to parliament. This act does not apply to joint-stock banks, nor to schools, or scientific and literary institutions, nor to loan or benefit building societies duly enrolled, nor to friendly societies or similar institutions, unless they assure to the amount of 200*l*. on any one life. The act does not extend to companies in Scotland, except they have branch establishments in England or Ireland.

The 7 & 8 Vict. c. 111, is entitled 'An Act for facilitating the winding up the affairs of Joint-Stock Companies unable to meet their pecuniary engagements.' By this act a fiat in bankruptcy may be issued in the same way as in the case of single traders against incorporated commercial or trading companies, or any other body of persons associated together for commercial or trading purposes; but the bankruptcy of a company does not involve the bankruptcy of any member individually. This act applies to all banking companies which have more than six partners.

JOINT TENANCY signifies joint ownership of two or more persons in land, or other property, as goods and chattels. It differs from Tenancy in Common and Coparcenership in the following essentials: Joint tenants are considered to be severally seised or possessed of the undivided whole of the land or other property in which they have a joint interest, and also of their several shares, which shares are always equal shares, inasmuch as joint tenants take by purchase only, and by a joint title: the estate or interest must be limited to the several persons by the same deed or instrument, and such estate or interest must vest in them at the same time, except (according to the more common opinion) the estate be limited to take effect under the Statute of Uses or by devise, in which case the contemporaneous vesting of the several parts is not necessary: the whole estate or property goes to the survivors and survivor of the joint tenants, if the jointure continue until such survivorship; which is the important characteristic of a joint tenancy. Any joint tenant may transfer his interest to any one of his companions by release; and any joint tenant may convey his share to a stranger by grant; or he may compel his companions to make a partition. Every person to whom the interest of a joint tenant is transferred becomes, as to such share, a tenant in common with the remaining joint tenants.

A joint tenant cannot dispose of either the whole or the part of the property in which he is jointly interested consistently with the proper notion of a joint tenancy, by a will made during the continuance of the joint tenancy, even though he should happen to be the survivor; because until he has survived he has nothing to dispose of by will. But by severing the joint tenancy he acquires the power of disposing of his share by will. By a recent act (1 Vict. c. 26), a person may, by a will made according to the provisions of that act, dispose of all real and personal estate to which he shall have a legal or equitable title at the time of his death, and which, if not disposed of by will, would go to his heir, or the heir of his ancestor, or to his personal representatives. But this act gives no power of disposal over the unsevered interest of a joint tenant.

JOINVILLE. [MARNE-HAUTE.]

JOINVILLE, JEAN, SIRE or LORD DE, born of a noble family of Champagne. Joinville accompanied Louis IX. of France in his first crusade in 1248, and his narrative of the six years during which that crusade lasted is extremely interesting. It is entitled 'Histoire de St. Louis IX., Roi de France, par Jehan Sire de Joinville,' and has been often republished. One of the best editions is that by Ducange, fol., 1668. It has been translated into English by T. Jones, 2 vols. 4to., 1807. Joinville, after his return to his native domain, continued to enjoy Louis's confidence. Joinville avoided the court of Philip le Bel, but is said to have joined the army which Louis X. collected at Arras against the Flemish. He died not long after; but the precise date is not known. Joinville and his predecessor Villehardoin are among the oldest of the French chroniclers who wrote in the vernacular tongue.

JOLIBA [QUORRA.]

JOMELLI, NICOLO, was born in 1714, near Naples. He was initiated in music by the Canon Muzillo, and afterwards studied at one of the Neapolitan conservatories.

Jomelli produced his first opera at Naples, being then only twenty-three years of age. In 1740 he was summoned to Rome, where he composed two operas. Next year he proceeded to Bologna, and brought out his 'Ezio.' He then returned to the papal capital, and produced one of his finest works, 'Didone.' This led to his being invited to Venice, where his 'Merope' for the Teatro Fenice, and a 'Laudate' for the church of Santo Marco, well sustained his reputation. In the following year he visited Germany, and at Vienna he formed an acquaintance with Metastasio, which ripened into a friendship of the closest kind. He was employed to give the Empress Maria Theresa instruction in music. He was afterwards recalled to Rome, and there produced several operas, and also his oratorio of 'La Passione.' The Duke of Würtemberg now prevailed on him to visit Stuttgard, in which city he resided nearly twenty years, and composed a very large number of Italian operas, and his 'Missa pro Defunctis,' or 'Requiem,' which will always be regarded as a monument of his genius. When the Duke of Würtemberg was obliged to reduce his establishment, Jomelli went to Naples, where he experienced an attack of paralysis, but recovered sufficiently to compose a Cantata and a 'Miserere,' the latter being by many considered the finest of his works. He died at Naples, in 1774.

JONAH is one of the twelve minor Hebrew prophets. It is said in 2 Kings, xiv., that he was the son of Amittai, of Gath-hepher, a city of the tribe of Zebulun. From the remainder of the passage some critics have supposed that Jonah lived under Jeroboam II., who reigned from 823 to 782 B.C., while others think that Jonah prophesied of Jeroboam, was consequently much earlier, and probably the earliest of the prophets whose time can be ascertained. There is no authentic information concerning Jonah later than what the book of Jonah records. The probability is that he returned from Nineveh to his own country, and died there. The history of Jonah is referred to in several passages of the New Testament (Matt. xii. 39 41 ; xvi. 4 ; Luke xi. 29, 30, 32), from which it appears improbable that the book of Jonah is to be considered merely a story of the nature of a parable, as some have supposed. The canonical authority of the book is generally admitted.

JONES, INIGO, was born in 1573, in the neighbourhood of St. Paul's, London. By his talent for drawing he attracted the notice of William, earl of Pembroke, by whom he was sent to Italy, and found himself in an entirely new world of art, which he carefully studied. Jones returned to England in 1605, and was employed at court in devising the machinery and decorations of masques and pageants. He was appointed architect to the queen and to Prince Henry. After a second visit to Italy he was employed to build the palace at Whitehall; and soon after the only portion ever built of it, namely the Banqueting House, was completed, he engaged in a task of a very different nature, that of ascertaining the origin and purpose of Stonehenge ; but he left the question, as he found it, a subject for speculation.

The church of St. Paul, Covent Garden, York Stairs, and Ashburnham House, Westminster, yet remain among his works in the metropolis. To give a list of all the buildings attributed to him would occupy a considerable space. He died in June 1653, at the age of eighty.

JONES, SIR WILLIAM, was born in London, September 28th, 1746. William Jones, his father, was a mathematician of some eminence.

Jones at the age of seven was sent to the grammar-school at Harrow, where during the last two years he did not confine himself to the study of the classical writers, but learned the Arabic characters, and made some progress in Hebrew. During the vacations he studied the French and Italian languages.

In 1764, at the age of seventeen, he entered at University College, Oxford. In 1765 he went to reside in the family of Earl Spencer, in order to superintend the education of Lord Althorp. During the five years that he stayed there he made great acquirements in Oriental literature, and obtained the reputation of being one of the first Oriental scholars of his age. In 1768 he was requested by the King of Denmark to translate the 'Life of Nadir Shah' from the Persian into French ; this translation was published in 1770, with a treatise on Oriental poetry, also written in French, in which he has translated several of the Odes of Hafiz into French verse. In the following year he published a grammar of the Persian language. In his 21st year he began his 'Commentaries on Asiatic Poetry,' which were written in Latin, and published in 1774, under the title of 'Poeseos Asiaticæ Commentariorum Libri Sex.' In 1771 he replied anonymously in French to Anquetil du Perron, who had attacked the University of Oxford and some of its learned members in his introduction to the 'Zend-Avesta.' In 1772 Mr. Jones published a small volume of poems consisting chiefly of translations from the Asiatic languages.

In 1774 Mr. Jones was called to the bar. While diligently attending the courts of law, he wrote an essay on the law of bailments ; but his legal studies were superficial. In 1783 he was appointed a judge in the supreme court of judicature at Fort William in Bengal, and was knighted. A few weeks after he married Miss Shipley, the eldest daughter of the Bishop of St. Asaph.

Sir William Jones arrived at Calcutta at the close of the year, where he was mainly instrumental in forming a Society 'for inquiring into the history and antiquities, the arts, sciences, and literature of Asia.' To the 'Asiatic Researches,' which were published by this Society, of which Sir William Jones was the first president, Oriental scholars in Europe are indebted for much of their knowledge of the literature and antiquities of the Hindoos.

The study of Sanskrit principally engaged the attention of Sir William Jones during the first three or four years of his residence in Bengal. When he had attained sufficient proficiency in this language, he undertook to prepare a copious digest of Hindoo and Mohammedan law. It was unfinished at the time of his death, but has since been completed under the superintendence of Mr. Colebrooke. The laws of Manu were translated by Sir William Jones, and published separately in 1794. He died at Calcutta, April 27, 1794, after a few days' illness. Besides the Latin, Greek, Arabic, Persian, Sanskrit, Turkish, and Hebrew languages, Sir W. Jones knew enough of Chinese to translate an ode of Confucius, and was also well acquainted with nearly all the modern languages of Europe.

A complete edition of the works of Sir William Jones was published in 6 volumes 4to., 1799, and in 13 volumes 8vo., 1807, with his life by Lord Teignmouth.

JONES, JOHN PAUL, was born in Scotland, July 6, 1747. The name of his father was Paul; the addition of Jones was assumed by the son after he grew up in life. He went to sea at the age of twelve, and, after making many voyages to America and other parts, was in 1768 made captain and supercargo of a vessel. Having made a good deal of money, he settled in Virginia, in 1773, on a property which fell to him by the death of an elder brother. After the Declaration of Independence by the colonies, he offered his services in the war against his native country, in which he soon greatly distinguished himself. In 1778 and 1779 he cruised off the coasts of England and Scotland, and caused great alarm with his single ship. At Paris, Louis XVI. presented him with a richly ornamented sword bearing a flattering inscription, he was invested with the military order of Merit, and received in every way the most distinguished reception, both from the government, the court, and in general society. On his return to America, in February 1781, a gold medal was voted to him by Congress. He then served till the peace under the French admiral D'Estaing, after which he proceeded to Paris with the appointment of agent for prize money. Some years afterwards he entered the Russian service with the rank of rear-admiral; but disputes with the Russian naval authorities soon compelled him to retire, on which he returned to Paris, where he died, July 18, 1792.

JONES, JOHN, LL.D., was born in the parish of Llandingat, in Caermarthensbire, where his father was a respectable farmer. He was educated at a grammar-school at Brecon, and afterwards became a student at the Unitarian New College, Hackney, where he was a favourite pupil of Gilbert Wakefield. During the greater portion of his life he lived in London, partly occupied as a Unitarian minister, partly as a classical teacher, and partly as an author. Among his numerous works, one of the most important was, 'Illustrations of the Four Gospels, founded on circumstances peculiar to our Lord and the Evangelists,' Lond., 1808, 8vo. In 1803 he published a short Latin Grammar for the use of schools; in 1804, a Greek Grammar, which ha been frequently reprinted, but the year before hi death he remodelled it, and changed the title t that of 'Etymologia Græca.' In 1812 he pub lished a Latin and English Vocabulary, which h republished in 1825 as 'Anthologiæ Latinæ, or Development of the Analogies by which the Part of Speech are derived from each other.' His chie work however was his 'Greek and Englis Lexicon,' which was published in 1823, in 1 vo 8vo., and again in 1826. Dr. Jones died in 1827

JONE'SIA, a genus of plants of the tribe *Cas sieæ*, and of the natural family of *Leguminosa* The species are few in number, and indigenous i the islands of the Malayan Archipelago. The form trees which are highly ornamental.

JONSON, BENJAMIN, was born in Wes minster, in 1574, and educated at Westminste School. The early part of his life is somewha uncertain; but it is known that he went to Cam bridge, and on leaving college took to the stag where he proved but an indifferent actor an at first an indifferent author. In 1598 his fame ros by the production of the comedy of 'Every Ma in his Humour,' at the Globe Theatre, and fro this time he wrote a play a year, for several su cessive years. His writings are numerous an well known. In 1616 he published his work in folio. In 1619 he was made poet-laureat with a salary of 100*l.* a year and a tierce wine. He died August 6, 1637, and w buried in Westminster Abbey. 'Every Ma in his Humour' is the only play of Jonso that has kept possession of the stage.

JONZAC. [CHARENTE INFE'RIEURE.]

JOPPA. [SYRIA.]

JORDAENS, JACOB, was born at Antwe in 1594. He studied under Adam van Oort, a also received instruction from Rubens. H pictures are distinguished by powerful, brillia and harmonious colouring, as well as knowle of chiaroscuro; but he is deficient in elegance a taste: he copied nature as he found it. He d in 1678, aged eighty-four. His works are ve numerous.

JORDAN. [SYRIA.]

JORTIN, JOHN, D.D., was born in 1698 London. He received his grammar educatio the Charter House, whence he passed to J College, Cambridge, of which he became a Fell

While living at Cambridge he publishe small volume of Latin poems. His college sented him to a living in Cambridgeshire, he determined on residing in London, where soon became an admired preacher. In 175 obtained the living of St. Dunstan in the In 1762, when Dr. Osbaldeston became bish London, Jortin was appointed his domestic lain, and was presented with a prebend in church of St. Paul and the living of Kensing He fixed his residence at Kensington, wher died in 1770, and was buried in the church of that place.

Dr. Jortin published in 1731 a critical wo considerable interest, entitled 'Miscellaneous servations on Authors, Ancient and Modern.' 1751 the first volume appeared of his 'Rem

upon Ecclesiastical History;' and in 1758 he published his 'Life of Erasmus.'

JORULLO. [MEXICO.]

JOSEPH I., emperor of Germany, succeeded his father Leopold I. in 1705. He carried on the war 'of the Spanish Succession,' which had begun under his father, against Louis XIV. The allied armies under Prince Eugene and Marlborough were prosperous in his reign. The battles of Ramilies, Oudenarde, and Malplaquet, the deliverance of Turin by Prince Eugene, the surrender of Naples to the Austrians, and the permanent footing obtained by the Archduke Charles in Spain, seemed to have nearly decided the question, when Joseph died of the small-pox in April 1711, leaving his brother Charles VI., the last male heir of the house of Habsburg, to conclude the war.

JOSEPH II., eldest son of Maria Theresa and of Francis of Lorraine, was elected king of the Romans in 1764, and in the following year, on the death of his father, he became emperor. Joseph joined Catherine of Russia in a war against Turkey, which his general, Laudon, carried on with success, taking Belgrade and other fortresses in 1789. But the threatening aspect of affairs in France and Brabant arrested the progress of the Austrian armies, and Joseph himself died in 1790. The character in which Joseph is chiefly viewed is that of a reformer; but his reforms, though well intended, were not judiciously devised, or well carried out. They led ultimately to the separation of the Belgian provinces from the Austrian monarchy, and to an insurrection in Hungary which his successor Leopold had some difficulty in suppressing.

JOSEPHUS, FLA'VIUS, the Jewish historian, was born at Jerusalem A.D. 37. By his mother's side he was descended from the Asmonæan princes, and his father Matthias belonged to a high sacerdotal family. Josephus was brought up at Jerusalem with his brother Matthias. He was early celebrated for his learning, and, after long study and experience of the tenets of different sects, he embraced those of the Pharisees. On the breaking out of the Roman war, he at first joined the party in favour of peace; but when, after the defeat of the Roman general Cestius, peace appeared hopeless, he acted wirh great vigour as a commander against the Romans, until he was taken prisoner by Vespasian in A.D. 67, after having defended the town of Jotapata to the last extremity. Instead of being put to death, as was the fate of his companions, he was received by Vespasian with honour, in consequence of his artfully predicting that Vespasian would shortly succeed Nero in the government of the Roman empire. He was present with Titus at the siege of Jerusalem, and endeavoured to prevail upon his countrymen to submit to the Romans. On the taking of the city, Titus offered to grant him anything he wished. He asked for the sacred books, and the lives of his brother and fifty friends. He received a large estate in Judæa, and upon going to Rome was admitted to the privileges of a Roman citizen by Vespasian, who also gave him an annual pension and apartments in his own house. After the death of Vespasian, he continued to live in Rome in high favour with Titus and Domitian. The time of his death is uncertain; he was alive at the latter end of the first century, and probably at the beginning of the second.

The first work published by Josephus was the history of the 'Jewish War;' it was originally written in the Syro-Chaldaic language for the use of those Jews who lived beyond the Euphrates. He afterwards translated it into Greek for the benefit of the learned Romans. Many years afterwards, A.D. 93, Josephus published in Greek his great work on the 'Antiquities of the Jews.' He also wrote 'Two Books against Apion,' in reply to those Greeks who questioned the truth of the early part of his work on the 'Antiquities of the Jews.'

The works of Josephus have been frequently translated into most of the modern languages of Europe. The best English translation is by Whiston.

JOSHUA, a book of the Old Testament, so called because it records the exploits of Joshua, the son of Nun, who succeeded Moses in the command of the Israelites. Joshua led the Israelites over the Jordan, B.C. 1451, and in the course of seven years conquered the greater part of Palestine, and assigned a particular part of the country to each of the tribes. He died at the age of 110, and was buried at Timnath-serath, in Mount Ephraim (Josh. xxiv. 29, 30).

The author of the Book of Joshua and the time in which it was written are equally uncertain. But, at whatever time it may have been written, the author appears to have compiled the greater part, if not the whole, of the work from very ancient documents, some of which were probably drawn up by Joshua himself.

The canonical authority of this book has never been disputed. In all the MSS. of the Old Testament it immediately follows the Pentateuch.

JOSQUIN, DEPREZ, a musical composer whose date and place of birth are both matters of dispute; but he is supposed to have been born in the Netherlands, about 1450. He was a singer in the pontifical chapel in the time of Sixtus IV., who sat in the papal chair from 1471 to 1484. Quitting Italy, Josquin was appointed Maitre de Chapelle to Louis XII., for whom he composed much music, and a motet or two so contrived that the monarch was enabled to take a part in the performance. Louis had made him a promise of a benefice, but neglected to redeem it. To remind the king, the composer produced a motet beginning 'Memor esto Verbi tui,' &c. This not producing the intended result, Josquin wrote another, upon the words, 'Portio mea non est in Terrâ Viventium.' Louis then took the hint, gave him a benefice, and the composer expressed his gratitude in a third motet, commencing, 'Bonitatem fecisti cum Servo tuo, Domine.' Hawkins and Burney give Josquin the character of a voluminous and clever composer.

JOUDPOOR. [RAJPOOTANA.]

JOUVENCY, PIERRE, was born at Paris in 1643, studied at Caen and afterwards at La Flèche, with considerable success, and was at an early age admitted a member of the Society of

the Jesuits. He devoted himself chiefly to history, and is the author of the fifth part of the 'History of the Jesuits from 1591 to 1616,' which was published at Rome in 1710. Though an agreeable writer, from the purity and elegance of his style, his facts are not to be implicitly relied on. He published several other works, one of which was 'A Collection of Latin Harangues pronounced by him on different occasions,' of which the Latinity is generally admired. Jouvency died at Rome in 1719, while engaged in the continuation of the 'History of the Jesuits.'

JOUVENET, JEAN, a French painter during the reign of Louis XIV., was born at Rouen in 1644. He was first instructed by his father Laurent Jouvenet, but completed his studies in Paris, where in 1675 he was elected into the Academy of Painting for a picture of Esther before Ahasuerus, which is one of the best paintings of the Academy collection. Jouvenet became successively professor, director, and perpetual rector of the Academy, and he was granted a small pension by Louis XIV. He died in 1717.

There are ten of Jouvenet's pictures in the Louvre, some of which are his best works, as the Miraculous Draught of Fishes, the Resurrection of Lazarus, the Sellers driven from the Temple, Christ in the House of Simon the Pharisee, and the Descent from the Cross. Of his mural paintings the principal are the colossal frescoes of the Apostles, painted on the dome of the church des Invalides.

JOVELLA'NOS, GASPER MELCHIOR DE, was born at Gijon in the Asturias, in 1749. Although of noble lineage, being nephew to the Duke of Losada, he possessed but a moderate patrimony. In 1778 he was made chief judge of the King's Court at Madrid. He was afterwards removed, upon some futile pretexts, but was again recalled, and raised to the office of minister of grace, or home secretary of state, for a few months, when the influence of the unprincipled Godoy expelled him. He now returned to Gijon, and busied himself with plans for public instruction, but he could not escape persecution, and in 1797 he was arrested, and confined in the castle of Bellver, in Majorca. Even during this period of upwards of seven years, he prosecuted his studies. At length, after the downfal of Godoy, he was permitted to return by Ferdinand VII., and, on that sovereign's abdication, was chosen member of the central junta. When that body was dissolved, the illustrious veteran returned to Gijon, to be shortly after driven from his home when the French invaded Asturias, in 1812. Within two months death liberated him from all his persecutors.

As a writer on subjects of political economy and legislation, Jovellanos stands foremost among his countrymen; but, besides his productions of that class, he wrote numerous others, among which may be mentioned his celebrated 'Pan y Toros,' the tragedy of 'Pelayo,' the comedy of 'El Delincuente Honrado,' a translation of the first book of 'Paradise Lost,' besides several other works.

JOVIA'NUS, FLA'VIUS CLAU'DIUS, born A.D. 331, served in the army of Julian in his expedition against the Persians, and, when Julian was killed, A.D. 363, the soldiers proclaimed him his successor. Jovianus accepted from the Persians terms which were offensive to Roman pride; but he was obliged to submit, as his soldiers were in the utmost destitution. Jovianus surrendered Nisibis to the Persians, and the inhabitants withdrew to Amida, which became the chief Roman town in Mesopotamia. On his arrival at Antioch, Jovianus, who was of the Christian faith, revoked the edicts of Julian against the Christians. He also supported the orthodox or Nicene creed against the Arians. After staying some months at Antioch, he set off during the winter to Constantinople, and, on his way, paid funeral honours to Julian's remains at Tarsus. At Ancyra he assumed the consular dignity, but a few days after, being at a place called Dadastana in Galatia, he was found dead in his bed. He died on the 16th of February, A.D. 364, being 33 years of age, after a reign of only seven months. The army proclaimed Valentinianus as his successor.

JOVI'NUS assumed the imperial title under the reign of Honorius, and, placing himself at the head of a mixed army of Burgundians, Alemanni, and others, took possession of part of Gaul, A.D. 411. Ataulphus, king of the Visigoths, having made peace with Honorius, attacked and defeated Jovinus, who was taken prisoner and put to death at Narbo (Narbonne), A.D. 412.

JOVIUS, PAUL. [GIOVIO.]

JUAN FERNANDEZ. [FERNANDEZ.]

JUAN DE ULUA. [VERA CRUZ.]

JUBA I., son of Hiempsal, king of Numidia, succeeded his father about 50 B.C. He was a warm supporter of the senatorial party and Pompey, and he gained, B.C. 49, a victory over Curio, Cæsar's lieutenant in Africa. After the battle of Pharsalia, when Cæsar invaded Africa, B.C. 46, he supported Scipio and Cato. The battle of Thapsus turned the scale in Cæsar's favour, and Juba put an end to his life.

JUBA II., the son of Juba I., was carried to Rome by Cæsar, kindly treated, and well educated. He gained the friendship and fought in the cause of Augustus, who gave him the kingdom of Mauritania, his paternal kingdom of Numidia having been erected into a Roman province. He cultivated the arts of peace, was beloved by his subjects, and had a high reputation for learning. He wrote, in Greek, of Arabia, with observations on its natural history; of Assyria; of Rome; of painting and painters; of theatres; of the qualities of animals; on the source of the Nile, &c. Juba married Cleopatra, the daughter of M. Antonius and Cleopatra, queen of Egypt.

JUDA, JUDÆA. [JEWS; PALESTINE.]

JUDAS MACCABÆUS succeeded his father Mattathias (B.C. 166) as the leader of the Jews in their attempts to throw off the yoke of the Syrian kings (1 Macc. iii. 1). He was very successful against Antiochus and his successor Antiochus Eupator. Anxious, however, to render Judæa independent, and feeling the difficulty of continuing the contest against the whole power of the Syrian empire, Judas sent ambassadors

Rome to solicit an alliance with the Roman people (1 Macc. i. 8; Justin, xxxvi. 3). This was readily granted by the Romans; but, before Judas could receive any assistance from his new allies, he ventured to attack the Syrian army under Bacchides, amounting to 22,000, with a force of only 800, and after an obstinate struggle was at length defeated, and perished in the contest (B.C. 160).

JUDAS TREE. [CERCIS SILIQUASTRUM.]

JUDE, THE EPISTLE OF SAINT, a book of the New Testament, was probably written by the Apostle Jude, who was surnamed Lebbæus and Thaddæus (Matt. x. 3; Mark iii. 18; John xix. 22). He is also called the brother of James (Luke vi. 16; Acts i. 13), and the brother of Christ (Matt. xiii. 55). The Epistle of Jude appears to have been written shortly before the destruction of Jerusalem.

The canonical authority of this epistle has been rejected by many, because the apocryphal books of Enoch and the Ascension of Moses are supposed to be quoted in it (v. 14, 9). But the greater number of the Fathers refer to it as a work of divine authority.

JUDEX, JUDICIUM. It is of some importance to form a correct notion of the terms *judex* and *judicium* in the Roman writers. The *judicia privata* were those in which one party claimed something of or against another party, and must be distinguished from the *judicia publica*. The former had relation to *actiones*, and may be generally described as Civil actions; the latter were of the nature of Criminal prosecutions.

The judices must to some extent have settled questions of law, inasmuch as the determination of the fact sometimes involved the interpretation of the law. They were accordingly allowed to have assessors (consilium) learned in the law (jurisconsulti); but the jurisconsulti merely advised the judices, who alone delivered the decision. In case of doubt as to the law, the judices might consult the magistrate under whom they were acting; but, as to the matters of fact, the judices were the sole judges, and could take no advice from the magistrate ('Dig.' v. 1. 79). The Roman *judices* were not necessarily lawyers, and the Roman magistrates who had 'jurisdictio, were only annual functionaries; so that there does not appear to have been any class of men among the Romans, like our judges, who were the living interpreters of law for a series of years in succession. The jurisconsulti seem to have kept the Roman law together as a coherent body. [JUSTINIAN'S LEGISLATION.]

A court is often mentioned by the Roman writers, the origin and constitution of which, if they could be thoroughly ascertained, would throw great light on the Roman judicial system, and indeed on the Roman polity generally. We allude to the *Judicium Centumvirale*, which in the earlier times of the Republic was a court in which weighty matters of law were decided. This court gradually declined, but was restored by Augustus. L. Crassus and Q. Scævola had pleaded before the *Centumviri*. (Cic. De Orat. i. 39.) The origin, number, and constitution of this body are not known, though some writers say that the number was 105, three being chosen from each tribe. (Festus, *v.* 'Centumviralia.') But there were not thirty-five tribes till A.U.C. 513, and therefore it might be inferred that the Centumviral body was of comparatively recent date. The Centumviri were not *magistratus*, but a college of *judices*, who decided in Judicia Privata.

JUDGE (from the French *juge*, which is from the Latin *judex*). A judge in England and Wales is a man who presides in a court duly constituted, declares the law in all matters that are tried before him, and pronounces sentence or judgment according to law. There are judges of the three Superior Courts of Law at Westminster, judges in the Courts of Equity, a judge in the Court of Bankruptcy, judges of the Insolvent Court, judges in the Ecclesiastical and Admiralty Courts, and some others. Some judges are called Recorders, and there are other names, but the name does not alter the nature of the office. When the judges simply are spoken of, the judges of the superior courts of common law are meant. There are fifteen judges of these courts: five in the Court of Queen's Bench, five in the Court of Common Pleas, and five in the Court of Exchequer. There are at present five judges in equity.

The judges of the superior courts of law are appointed by the crown. They hold their office during good behaviour, and notwithstanding the demise of the crown (1 Geo. III. c. 28). They can be removed by the crown on the address of both houses of parliament (13 Wm. III. c. 2). The judges of the courts of equity are also appointed by the crown.

Retiring pensions are given to the fifteen judges and to the judges in equity, under various acts of parliament. The highest retiring pension is 5000*l*., which may be granted by the crown to the lord-chancellor upon his resignation.

Judges of courts of record are not liable to prosecution for anything done by them as judges, but they may be prosecuted in parliament. Nor are they liable to an action for any error in judgment or for wrongful imprisonment, at least when they are acting within their jurisdiction. Judges are punishable for bribery, by loss of office, fine, and imprisonment. The powers and duties of judges would form the subject of an elaborate treatise.

JUDGES, THE BOOK OF, a book of the Old Testament, which gives an account of the history of the Israelites from the death of Joshua to that of Samson. The author of the book and the time in which it was written are equally uncertain. It is commonly ascribed to Samuel, though some have argued, from Judges xviii. 30, that it could not have been written till the time of the Babylonish captivity. The canonical authority of this book has never been disputed. It is placed in all the Hebrew MSS. immediately after the Book of Joshua. It is quoted by Philo and Josephus, and also by the author of the Epistle to the Hebrews (xi. 32).

JUDGMENT is the sentence of the law pronounced by the court upon the matter in the record, and the remedy prescribed by law for the

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redress or punishment of injuries, the suit or prosecution being the vehicle by which the injury is brought before the court. Judgments are given under four heads of issues: on Demurrer, where the facts are admitted by the parties, and the law determined by the court; on Verdict, where the law is admitted and the fact disputed; by Confession or Default, where the defendant admits both the law and the fact; and on Nonsuit or Retraxit, where the plaintiff acknowledges that neither the law nor the facts are sufficient to support his case, and therefore abandons the prosecution.

Judgments are either interlocutory or final. Interlocutory judgments include all those which are given on account of the incomplete state of the case as brought before the court, and which do not go to the absolute merits of the case: such as judgments on pleas of abatement. But the largest class to which this term is applied are judgments which decide the right between the parties, but require some other proceeding to determine the amount to be recovered. This proceeding is commonly a writ of inquiry, directed to the sheriff, who impanels a jury, and proceeds to assess the amount of damages to which the party in whose favour the interlocutory judgment has been given is entitled. If, however, the suit is for a specific thing or sum, and the decision of the court determines whether the plaintiff is or is not entitled to recover the remedy he sues for, the judgment is final.

The mode of signing judgment, as it is termed, and thereupon suing out execution, in order to obtain the effect of the judgment, are matters that properly belong to treatises on legal procedure. The object of the execution is either to give the person who has obtained a judgment in his favour some particular thing, or compensation for it or value out of the property of the defendant. Recent statutes have made great changes in the law as to the way in which judgments affect real property. These statutes are the acts of the 1 & 2 Vict. c. 110, 2 & 3 Vict. c. 11, and 3 & 4 Vict. c. 82, by which decrees and orders of Courts of Equity and rules of Courts of Common Law, and orders of the lord-chancellor in matters of bankruptcy and lunacy, have the effect of judgments, and the security of the creditor has been extended from a moiety, which was given by 13 Edw. I. stat. 1, c. 18, West. 2, to the whole of the debtor's lands, including copyholds, and making leaseholds bound in the same manner as freeholds. And, as all lands are included by the acts over which the debtor may have a disposing power, judgments against a tenant in tail are binding on his issue; for the tenant might at any time have barred the entail. But the greatest alteration which recent statutes have worked is changing the effect of judgment before execution is sued out, from a general lien to a specific charge upon the 'lands, tenements, rectories, advowsons, tithes, rents, and hereditaments' of which the judgment debtor may, at the time of entering up judgment, or at any time afterwards, be possessed, of any estate whatsoever, at law or in equity, or over which he may have any disposing power. All judgments

are made binding on the persons against whom they are entered up, and against all persons claiming through them, the judgment creditor being entitled to the same remedies in a court of equity as if the debtor had by writing agreed to charge the lands, &c. The creditor is not, however, to proceed in equity to obtain the benefit of such a charge until the expiration of one year from the time of entering up such judgment; and, in case of bankruptcy, the judgment, unless entered up one year, is to give no preference to the judgment creditor beyond creditors for simple contract. A special proviso excepts purchasers, mortgagees, or creditors previous to the time when the act came into operation; and, with respect to purchasers for valuable consideration without notice, the rules of equity remain unaltered.

A judgment creditor, applying now for remedy to the Court of Chancery, will not be obliged to sue out the writ of elegit [ELEGIT]; for that which is agreed to be done is considered by a court of equity as actually performed, and the judgment creditor has, therefore, by virtue of his judgment alone, an equitable estate. If however a judgment creditor, having obtained any charge, or being entitled to the benefit of any security, should, before the property so charged or secured is converted into money and applied towards the payment of the judgment debt, cause the judgment debtor to be arrested, the benefit of such charge or security is deemed relinquished. The extent of such charge goes now to the interest at the rate of four per cent. on the judgment debt, as well as to the debt itself.

Judgments or rules or orders of inferior courts of record, in which a barrister of not less than seven years' standing shall preside, may receive the same effect as those of a superior court by a judge's order to remove them into a superior court. But, until execution be actually sued out, they will not affect lands in the hands of purchasers, mortgagees, or creditors, except so far as they would affect them as judgments of an inferior court.

In criminal proceedings, after trial the defendant can move in arrest of judgment at any time before judgment is pronounced, but this can only be done upon error appearing on the face of the record, and no motion of this sort can be made in the defendant's absence, unless a verdict is found in which the jury reserve a point for the consideration of the court. After the judgment is recorded, a writ of error is necessary before it can either be reversed or altered. Formerly no judgment affecting the liberty of the individual could be pronounced in his absence; but this has been altered by the 11 Geo. IV. & 1 Wm. IV. c. 70, which enacts that, upon trials for felonies or misdemeanours, judgment may be pronounced whether the person affected be present or absent, except only in such cases of information filed by leave of the Court of King's Bench or in cases of information filed by the attorney-general where he prays that judgment may be postponed. The judgment of the court extends to the life and liberty of the offender according to the punishment decreed to the offence against which the judgment

s delivered. In some cases it extends to the ompensation by forfeiture of the lands or goods, r both, of the offender; others induce a disability f holding offices or fix a lasting stigma on the ffender; and a large proportion are merely pecu- iary by stated or discretionary fines.

On the subject of judgments see Chitty's *Jeneral Practice;* Stephen, *On the Principles of Pleading in Civil Actions;* Sugden's *Vendors nd Purchasers;* Prideaux, *On the Law of Judg- ents as they affect Real Property.*

JUDITH, an apocryphal book of the Old Tes- ament, contains an account of the invasion of yria and Judæa by Holofernes, general of the ssyrians, and of the destruction of the Assyrian rmy, and the death of Holofernes through the ourage and stratagem of Judith. The historical nd geographical difficulties of this book are so reat, and its narrative so improbable, that a great umber of critics are disposed to consider it as religious romance, probably written in the time f the Maccabees, to encourage the Jews in their truggles against the Syrian monarchs. Grotius onsiders it as an allegory, and Josephus, who eldom neglects an opportunity of extolling the alour of his countrymen, takes no notice of this tory.

The book of Judith was originally written in haldee, from which it was translated into Latin y Jerome. It was also translated into Greek nd Syriac. The English translation in the au- horised version was made from the Greek.

JUGGURNAUTH. [Vishnu.]

JUGLANDA'CEÆ, a natural order of apeta- ous exogenous plants, consisting of trees or hrubs having eatable nuts and somewhat resinous eaves. The former are the walnuts and hickory uts of the markets; the first produced by the enus *Juglans*, the latter by that called *Carya*. he timber of this genus is valuable, as likewise hat of *Juglans niger*, the Black American Walnut.

JUGULAR VEINS are the large trunks by hich the greater part of the blood is returned to he heart after having circulated in the head, face, nd neck. There are two on each side; one ex- ernal or superficial, and the other internal or deep.

JUGURTHA, the illegitimate son of Manas- bal, and grandson of Masinissa, was brought up nder the care of his uncle Micipsa, king of umidia, who sent him with a force to join Scipio Emilianus in his war against Numantia in Spain. ugurtha became a great favourite with Scipio. Micipsa adopted him, and declared him joint heir vith his two sons Adherbal and Hiempsal. After Micipsa's death (B.C. 118), Jugurtha effected the murder of Hiempsal, and Adherbal, escaping to Rome, appealed to the senate. Jugurtha however ribed some of the senators, and a commission as sent to Africa in order to divide Numidia etween Jugurtha and Adherbal. The commis- oners gave the best portion to Jugurtha, who on after their departure invaded the territory f his cousin, besieged him in Cirta, and put him to a cruel death (B.C. 112). In the following year he Romans declared war against Jugurtha, and n army was sent to Africa under Calpurnius estia. After some fighting, Jugurtha obtained under favourable conditions the quiet possession of the usurped kingdom. But the treaty was not ratified at Rome, and, Calpurnius being recalled, the new consul, Posthumius Albinus, was appointed to the command in Africa. Meantime Jugurtha, being summoned, appeared at Rome; but he bribed several of the senators, and no judgment was given. Jugurtha, emboldened by this suc- cess, caused Massiva, son of his uncle Gulussa, whom he suspected of aiming at his kingdom, to be assassinated in the Roman capital. The crime was traced to Jugurtha; but, as he was in Rome under the public guarantee, the senate, instead of bringing him to trial, ordered him to leave Rome immediately.

Posthumius was sent to Africa to prosecute the war, but he soon returned to Rome, leaving the army under the command of his brother Aulus Posthumius, who was surprised in his camp by Jugurtha; and his army, having passed under the yoke, evacuated Numidia. The new consul, Metellus, carried on the war with great vigour. Caius Marius was then serving as lieu- tenant to Metellus, whom in the year B.C. 107 he supplanted in the command. Jugurtha mean- time, having allied himself with Bocchus, king of Mauritania, continued to give full employment to the Romans. Marius took the towns of Capsa and Moluca, and in a hard-contested battle de- feated the two kings. Bocchus made offers of peace, and Marius sent to him his quæstor Sulla, who induced Bocchus to give up Jugurtha into the hands of the Romans as the price of his own peace and security. Jugurtha was delivered to the Romans, and taken to Rome. After being exhi- bited in the triumph of Marius, he was put to death in prison. His two sons were sent to Venusia, where they lived in obscurity. The war against Jugurtha lasted five years; it ended in the year 106 B.C. (Sallustius *De Bello Jugurthino.*)

JULIAN ALPS. [Alps.]

JULIAN PERIOD is a term of years often employed in chronology, in order to avoid the ambiguity attendant on reckoning any time ante- cedent to our æra. The Julian Period consists of 7980 years, and is reckoned as having begun 4713 years before our æra, so that the present year 1849 corresponds to 6562 Jul. Per. The æra of the creation, or Anno Mundi, which has been used by Christian and Jewish writers, cannot be considered a fixed point, as chronologists and controversialists are not agreed as to the precise time of its commencement, some placing the cre- ation 4004 years B.C., others, such as the early Alexandrian Christians, 5502 B.C., and the Greeks and Russians at 5508 B.C. The Julian Period is produced by the multiplication of the lunar cycle 19, solar cycle 28, and Roman indiction 15.

JULIA'NUS, FLA'VIUS CLAU'DIUS, son of Julius Constantius, brother of Constantine the Great, was born A.D. 331. After Constantine's death, the soldiers massacred the brothers, ne- phews, and other relatives of that prince, in order that the empire should pass undisputed to his sons. Two only escaped from this butchery: Julian, then six years old; and his half-brother Gallus, then thirteen years of age. Constantius

exiled Gallus into Ionia, and intrusted Julian to the care of Eusebius, bishop of Nicomedia. Julian was instructed in Greek literature by Mardonius, a learned eunuch. About the age of fourteen he was sent to join his brother Gallus in Cappadocia, where they were treated as princes, but closely watched. The youths were taught the Scriptures, and were even ordained lecturers, and in that capacity publicly read the Bible in the church of Nicomedia. The death of Constans and Constantine having left Constantius sole master of the Roman world, that emperor, who was childless, sent for Gallus, in March 351, and created him Cæsar, and he allowed Julian to return to Constantinople to finish his studies. There Julian met with the sophist Libanius, who afterwards became his friend. Constantius soon after again banished Julian to Nicomedia, where he became acquainted with some Platonist philosophers. He afterwards obtained leave to proceed to Athens, where he devoted himself entirely to study. After the tragical death of Gallus, in 355, Julian was recalled to court by the influence of the Empress Eusebia, when Constantius named him Cæsar, and gave him the government of Gaul, together with his sister Helena to wife. Julian made four campaigns against the Germans, in which he displayed great skill and valour, and freed Gaul from the barbarians. He spent his winters at Lutetia (Paris), and became esteemed for his equitable and wise administration. Constantius, always suspicious, ordered Julian to send him back some of the best legions in Gaul to be employed against the Persians. In 360, Julian assembled the legions at Lutetia, and bade them farewell, when an insurrection broke out among the soldiers, who saluted him Augustus. Julian sent messengers to Constantius to deprecate his wrath, but the death of the emperor left the throne open to him (A.D. 361). He proceeded to Constantinople, where, being proclaimed emperor in December 361, he reformed the prodigality of the household, issued several wise edicts, corrected many abuses, and established a court at Chalcédon to investigate the conduct of those who had abused their influence under the preceding reign. On assuming the purple, Julian had openly professed the old religion of Rome, and, though at the same time he had issued an edict of universal toleration, he soon showed a marked hostility to the Christians. This was a signal for a persecution against the Christians in the provinces, where many were imprisoned, tormented, and even put to death. Julian restrained some of these disorders, but with no very zealous hand. He forbade the Christians to read or teach others the works of the ancient classics, and he also forbade the Christians filling any office, civil or military, and subjected them to other disabilities. Julian has been called the Apostate, but it seems doubtful whether after his boyhood he had been a Christian in his heart. That he was no believer in the vulgar mythological fables is evident from his writings, especially the piece called 'The Cæsars,' and yet he professed great zeal for the heathen divinities.

Julian, having resolved on carrying on the war against the Persians, repaired to Antioch. His neglected attire, his uncombed beard, and the philosophical austerity of his habits drew upon him the sarcasms of the population of Antioch. The emperor revenged himself by writing a satire against them, called 'Misopógon.' He set off on his expedition with a brilliant army, crossed the Euphrates, took several fortified towns of Mesopotamia, crossed the Tigris and took Ctesiphon, but here his progress ended. The close Roman legions were harassed by the light cavalry of the Persians, and reduced to great distress for want of provisions. Sapor, the Persian king, was however inclined to come to terms, when in a skirmish Julian received a mortal wound. He expired the following night, June 26, 363, with perfect calmness and composure.

Julian had many brilliant and some amiable qualities; his morals were pure and even austere; his faults were chiefly those of judgment, probably influenced by the impressions of early youth, an ardent and somewhat mystic imagination, and the flattery of those around him. His works consist of orations, satires, 'The Cæsars,' and about eighty letters, some of which are very interesting. The last and best edition of Julian's works is by Ezech. Spanheim, Leipzig, 1696, fol.; but it does not contain all the letters. A complete edition of the letters was published by L. H. Heyler, Mainz, 1828, 8vo. There is a French translation of Julian's works by La Bletterie, and a Life of him by Tourlet.

JULIA'NUS, SALVIUS, was probably a native of Milan. He was the great-grandfather of the Emperor Didius Julianus. Julianus was twice consul, and also Præfectus Urbi. Julianus was a distinguished jurisconsult, and one of the Consiliarii of Hadrian; and he may probably have attained the honour of the consulship under this emperor.

Salvius Julianus was a pupil of Javolenus Priscus, and therefore one of the Sabiniani. His authority was very great among the Roman jurists, and he is oftener cited by them than any other writer. His great work was the 'Edictum Perpetuum,' which was compiled in the time of Hadrian. His principal legal work was Ninety Books of Digesta. There are 457 excerpts from Julianus in the 'Digest' of Justinian, and chiefly from the work just mentioned.

JÜLICH-CLEVE-BERG, the name given to a former division of the possessions of Prussia on the Rhine, which now forms the governments of Düsseldorf and Cologne, and part of the government of Aachen in the Prussian Rhein-Provinz. The territory so named was composed of the three ancient duchies of Jülich, Cleves, and Berg. The town of *Jülich*, from which the duchy of Jülich was named, stands on the Rur, about 26 miles W. from Cologne, and has 3800 inhabitants, who manufacture soap, leather, and vinegar. It is fortified.

JULIUS I., II., III. [Pope.]

JULY, now the seventh, was originally the fifth month of the year, and was called by the Romans, in regard to its numerical station, *Quintilis*. In the old Latin or Alban calendar, Quintilis had a complement of 36 days. Romulus

duced them to 31; Numa to 30; but Julius Cæsar restored the day of which Numa had deprived it, which it has ever since retained. Our Anglo-Saxon ancestors called July *Mæd-monath*, 'mead month,' from the meads being then in their bloom.

JUMETZ. [Hainault.]

JUMILLAC. [Dordogne.]

JUMNA. [Hindustan.]

JUNCA'CEÆ, a small natural order of endogenous plants, so named from *Juncus*, the rush, which is considered its type. It is principally composed of obscure herbaceous plants.

JUNCAGINA'CEÆ, a small and unimportant order of Endogens, consisting of marsh plants. *Triglochin* is the commonest genus of the order, and inhabits the fresh or salt marshes of most parts of Europe.

JUNCUS ODORA'TUS. In old works on Materia Medica, as well as in many modern ones, we find a fragrant plant referred to under this name, and which is usually thought to be a kind of grass.

JUNE, the sixth month of the year, named from the Latin Junius. Ovid, in his 'Fasti' (vi. 25), makes Juno assert that the name was expressly given in honour of herself. In another part of the 'Fasti' (vi. 87) he gives the derivation *à junioribus* (the younger), as May had been derived from *Majores* (the elder).

In the old Latin calendar June was the fourth month, and consisted of twenty-six days. Thirty days were afterwards assigned to it.

JUNGERMANNIA'CEÆ, a rather extensive natural order of cryptogamic plants, or Acrogens, resembling mosses in appearance, but very distinct from them in many points of structure. The species inhabit the trunks of trees, damp earth, or even the young shoots and leaves of other plants in cool moist climates, especially such as are temperate. Some have the stem and leaf formed into a frond, or thallus, resembling that of a lichen, but more commonly the species have leaves with stipules at their base.

JUNIEN, ST. [Vienne, Haute.]

JUNI'PERUS, a genus of hardy, evergreen, woody plants, belonging to the natural order *Coniferæ*. About twenty species are known, the most important of which are the following:

J. communis, Common Juniper, growing wild in all the northern parts of Europe. Occasionally the Juniper becomes a small tree. The fruit is used in considerable quantities in the preparation of gin, and in medicine as a powerful diuretic. Oil of Juniper is said to be the most powerful of all diuretics in doses of four drops.

J. Sabina, Savin, is found wild in the middle of Europe and the west of Asia, inhabiting the most sterile soil, and is frequently met with in this country in shrubberies. Like the common Juniper, it is a diuretic and uterine stimulant, but is so powerful that its use is highly dangerous, except in the hands of regular practitioners. It is a well-known violent emmenagogue. Oil of Savin is a local irritant, producing blisters, when applied to the skin; taken internally, it is drastic and emetic.

J. Bermudiana, Bermuda Red Cedar, is very little known in Great Britain, in consequence of its not bearing the climate without protection. It is a native of the Bermudas, where it becomes a large tree, with a soft fragrant wood, the value of which is well known from its use in cabinet-work and the manufacture of pencils.

JU'NIUS, FRANCISCUS, father and son. The father was a Protestant minister in the Low Countries, best known by a translation of the Scriptures into the Latin tongue. He became professor of theology at Leyden, where he died in 1602. His son, born at Heidelberg in 1589, accompanied his father to Leyden, but soon relinquished study and embraced the profession of arms. In 1609 he betook himself to literature as a profession, and came to England in 1610, where he was soon entertained as his librarian by Thomas Howard, earl of Arundel. Junius remained thirty years in this honourable connection. We owe to him the publication of the version of the gospels, commonly called Ulphilas' Version, and the manuscript which contains it, 'The Silver Codex.' This was printed with many learned notes and other illustrations in 1665. His treatise on the 'Painting of the Ancients' is a useful book: but the work by which he is best known is a posthumous work, not printed indeed till 1743, entitled 'Etymologicum Anglicanum.'

Junius lived to his eighty-ninth year, dying in 1678, at Windsor, at the house of his nephew, Isaac Vossius. He formed a valuable collection of manuscripts, which he bequeathed to the University of Oxford, and they are now in the Bodleian Library.

JUNIUS'S LETTERS. [Francis, Sir Philip.]

JUNO, a Roman divinity, whose attributes are nearly the same as those of the Grecian *Hera*. She was the daughter of Kronos and Rhea, the sister and wife of Jupiter, the goddess of marriage and childbirth, and the protectress of married women. Her worship was of very great antiquity at Argos and in the Peloponnesus. The two most celebrated temples of Juno were at Argos and Samos.

JUNO. [Planets, Small.]

JU'PITER, the supreme Roman deity, known to the Greeks as *Zeus*. Jupiter was originally called Jov-is Pater, or Dies-piter, or Diu-piter, the *Diu* becoming softened in pronunciation into *Ju*, in the same manner as the Latin word *diurnus* has become *journal*. Jupiter, or Diupiter, would therefore mean the Father of day or the air; the first part of the word contains the same root as the Latin adverb *diu* and adjective *diu-rnus*.

Cicero says ('De Nat. Deor.,' iii. 21) that there were three deities of the name of Jupiter: one the son of Æther; the second, the son of Heaven; and the third, the son of Saturn.

The Roman poets attributed to Jupiter the same power and attributes with which the Greeks invested Zeus, who was, according to Homer, the son of Kronos and Rhea. His wife was Hera (Juno), and their children Hephæstus (Vulcan) and Ares (Mars). [Juno.]

Jupiter was usually represented as seated on an ivory throne, with a sceptre in his left hand and a thunderbolt in his right. The eagle, his favourite bird, was generally placed by the throne.

JUPITER, the name of one of the old planets, the largest of all the bodies except the sun, in the solar system. The astronomical history of this planet is so completely entangled in that of the progress of astronomy in general and pure mathematics, that it would be useless to attempt any separation.

The figure of Jupiter is sufficiently oblate to appear of a sensibly spheroidal form in a moderate telescope, the axis of revolution being to the equatorial diameter in the proportion of 167 to 177. The apparent equatorial diameter varies between half and three quarters of a minute, being 36.74″, when the planet is at its mean distance from the earth. The real equatorial diameter is 10.86 times that of the earth, or upwards of 86,000 miles. It is nearly 1300 times as large as the earth, and its mean density is nearly the same as that of the sun, or about one quarter of that of the earth.

The mass of Jupiter, from the time of Newton to the present, was supposed to be to that of the sun in the proportion of 2 to 2141; but the recent observations of various astronomers make it somewhat greater. Mr. Airy's result is that the mass of Jupiter is to that of the sun in the proportion of 1 to 1046.77, or 2 to 2094 nearly.

The planet revolves on its axis in about 10 hours. Its light and heat are to those of the earth as 37 to 1000. Its sidereal revolution is performed in 4332.5848212 mean solar days.

The four satellites of Jupiter appear to revolve on axes, each in the time of its revolution round the planet, in the same manner as our moon. The times of their revolutions are, roughly, $1\frac{3}{4}$, $3\frac{1}{2}$, 7, $16\frac{3}{4}$ days, and their distances from the planet 6, 10, 15, and 27 of his semidiameter.

In consequence of the smallness of the angle by which Jupiter's equator is inclined to the ecliptic, and of the nearness of the orbits of the satellites to the plane of the equator, all the satellites except the fourth, which sometimes escapes, undergo one eclipse once in every revolution. Since this is caused by the entry of the satellite into Jupiter's shadow, the eclipse is independent of the earth's position, and the observation can certainly be made, unless Jupiter be too near to the sun. It never happens that both the immersion and emersion can be observed, in the case of the first satellite, and rarely in that of the second; though it is otherwise with the third and fourth. The reason is, that the planet itself always hides a part of its own shadow, and the first satellite is so near the planet that it must either enter or leave the shadow behind the planet: which also happens, for the most part, in the case of the second satellite. Before the planet is in opposition its shadow is on the western side of the planet, and after opposition on the eastern; while before the opposition immersions only are visible, and after opposition emersions, in the case of the first and second satellities. The eclipses of the four several satellites last about $2\frac{1}{4}$, $2\frac{1}{2}$, $3\frac{1}{2}$, and $4\frac{1}{4}$ hours one time with another.

When Jupiter is in or very near opposition, the planet itself hides its own shadow entirely, so that both immersion into and emersion out of the shadow may be invisible from the interposition of the planet; so that we then have the eclipse of an eclipse. And, when the satellite passes between the sun and the planet, its shadow may throw a spot on the planet into darkness, which spot will appear to pass over the disc of the planet. Lastly, a satellite may pass between the planet and the earth; in which case it is seen sometimes as a bright and sometimes as a dark spot. The times of all these appearances are predicted in the Nautical Almanac.

JURA, Island. [ARGYLE; HEBRIDES.]

JURA, a department in France formed out of the province of Franche-Comté, and named from the range of mountains that traverses it, is bounded N. by the department of Haute-Saône, N.E. by that of Doubs, E. by Switzerland, S. by the department of Ain, and W. by those of Saône-et-Loire and Côte-d'Or. It lies between 46° 17′ and 47° 20′ N. lat., 5° 13′ and 6° 9′ E. long.; its greatest length from N. to S. is 72 miles, from E. to W. 39 miles. The area is 1919 square miles, and the population in 1846 was 316,150; which gives 164.74 to the square mile, being 9.01 below the average per square mile for all France.

The department is diversified by mountains, plains, and marshes. Two-thirds of its extent are covered with the JURA MOUNTAINS, of which the highest summits in the department are Reculet, La-Dôle, and Mont-Poupet. The surface presents throughout its whole length three very marked and distinct divisions:—1, the western part, which consists of a low plain about 7 miles wide; 2, the first mountain elevation, which rising suddenly from the plain forms a plateau nearly 10 miles wide; and, 3, the high mountain district to the east of the other two, consisting of lofty summits and deep valleys, and extending in width as far as the other two divisions together. The soil of the plain, which consists of a marly clay resting on alternate beds of earth and shingle, is very productive in wheat, rye, maize, buckwheat, hemp, &c. On the plateau the soil is calcareous and shallow; it yields barley, oats, maize, nuts, &c. Among the mountains the soil is stony and thin, some barley and oats are produced, but there is abundant pasture, on which, during summer, from June to October, great numbers of cattle and horses are fed. During that season the châlets, or solidly constructed huts, on the heights, serve as habitations for the herds, stores for the dairy produce, and as sheds for the cattle; in these the cows are milked, butter and cheese are made. There is one herdsman for every 20 cows, and one cheesemaker for every 80. The cows from the different communes pasture in separate inclosures, each about 300 or 400 acres in extent and surrounded by a wall of dry stones; they come of their own accord to the châlet to be milked by the herdsman, and immediately after return to pasture, for they never lair in the châlet. In these annual migrations of the cattle, the milking and the cheese and butter making are entirely managed by men. An account is kept of the quantity of milk given by the cows of each owner, so as to apportion a just share of the butter and cheese, or of their price when sold. On the 9th of October

(St. Denis's Day) the little establishments are all broken up, for then or soon after the rigours of a boisterous winter set in; the herdsmen tie their wardrobe, no great burden, between the horns of the best cows, and the descent is commenced. But, as all the cattle do not come from the same village, the herdsman follows only his own; the others, led by some sage old cow, direct their steps to their own village, where finally separating each one repairs to the house of her own master.

The farm buildings in the mountain districts are solidly built of stone and lime, but only 7 feet high, and covered with lengths of split fir, which are kept from being blown away by numerous stones laid on them. They include a dwelling-house, stable, barn, and hay-loft, all under the same roof, and communicating with each other. All the animals lair in the same stable, which extends quite across the building, and in which they are arranged in two rows, head to head, and feed from a manger that runs from one end of the apartment to the other. The cattle are never littered; but the floor is covered with loose planks, and overhead there is a covering of the same; otherwise the cattle could not stand the cold of the winter, which generally lasts from six to eight months. In that part of the structure appropriated to the family the chief apartment is about 13 feet square; in the centre stands a stove, whence the smoke issues through a tube carried up a wide chimney, which by means of a trap-door is kept closed on the windy side, and serves for a window all the year, and during the deep snows for a door also, the ascent being made by means of a short ladder. Adjoining this apartment is a chamber containing beds for the father, mother, and the daughters of the family; the sons and men-servants, if any, sleep in the hay-loft.

The department is drained by a great number of rivers, the principal of which are—the Ain: the Doubs: the Oignon, which bounds it on the north [Doubs]: and the Loue, which enters it from the department of Doubs, and running W. enters the river Doubs, a few miles S. of Dôle. Of these the Ain, the Loue, and the Doubs are navigable. Among the smaller rivers the most important are the Bienne, the Cuisance, and the Furieuse. The north of the department is crossed by the Canal-du-Rhône-au-Rhin. There are numerous marshes and lakes in the department, which is traversed by 5 royal, 24 departmental, and by 30 parish roads.

The climate differs with the elevation of the surface; it is cold in the mountains, where the snow lies frequently for 6 months; in the plain, which is cold enough in winter owing to the proximity of the snow in the highlands, the air is hot and close in summer, but on the plateau it is pure and healthy during that season. High winds are frequent at all seasons; they are attended by heavy rains in spring, and oftentimes in summer also.

The department contains 1,227,985 acres, distributed among 123,064 proprietors, and into 1,370,995 parcels. Of this area 452,498 acres are under cultivation; 124,909 are natural grass land; 51,961 are under vines; 359,289 are covered with woods and forests; and 195,242 consist of heaths and moors. The agricultural produce, which has been specified before, is barely enough for the consumption. Horned cattle are exceedingly numerous; there are but few sheep; poultry, bees, game, and fish are abundant. The produce of wine amounts to 7,854,000 gallons annually, the best growths being those of the districts about Arbois, Château-Chalon, and Lons-le-Saulnier.

Several iron mines are worked; gold, copper, lead, and coal are found; the peat beds are dug for fuel; marble, alabaster, and lithographic stone are quarried. There are important salt-works at Salins and Montmorot.

The manufacture of iron and iron wares, carried on in 101 smelting furnaces, forges, and foundries, is the most important object of industrial activity. The other manufactures are paper, watch and clock works; turnery in wood, bone, ivory, and horn; coarse woollens, linen, mineral acids, salt, casks, steel, scythes, nails of all kinds, tiles, and leather. There are 632 wind and water mills, and 345 factories of different sorts, besides the iron works before-mentioned; about 90 fairs are held in the year.

The department is divided into 4 arrondissements, which with their subdivisions and population are as follows:—

Arrond.	Cantons.	Communes.	Pop. in 1846.
Lons-le-Saulnier .	11	218	108,785
Poligny . . .	7	155	79,552
St.-Claude . . .	5	114	52,112
Dôle	9	242	75,701
Total . .	32	729	316,150

In the arrondissement of Lons-le-Saulnier the chief town, *Lons-le-Saulnier*, which is also the capital of the department, is situated at the foot of high vine-clad hills that surround it on every side, except the west, in 46° 40′ 28″, 5° 33′ 11″ E. long, at a distance of 225 miles S.E. from Paris, and has 8565 inhabitants. It is a pretty well-built town, and lighted with gas; the principal street is lined with arcades; and there are several handsome fountains. In the northern angle of the town are the important salt-springs, from which the water is constantly pumped up into a wooden canal that conveys it to the great salt-works at Montmorot, about a mile distant from the spring. The town is the seat of tribunals of first instance and of commerce, of communal and ecclesiastical colleges; it has also a public library, a museum, and a theatre. The manufactures consist of hosiery, potash, and leather; the commerce is considerable in salt, iron, timber, wine, brandy, cheese, &c. *St. Amour*, 18 miles S. from Lons-le-Saulnier, has marble-sawing mills, naileries, tan-yards, and 2527 inhabitants. *Baume-les-Messieurs*, 6 miles from Lons-le-Saulnier, is a small place, situated in a wild rocky gorge on the Seile, and is famous for its ancient Benedictine abbey, the church of which is in tolerable preservation, and contains tombs of the counts of Bourgogne.

In the arrondissement of Poligny, the chief town, *Poligny*, which is situated at the extremity of an extensive plain, and at the foot of a spur of the Jura chain, near the source of the Glantine, at a distance of 18 miles N.E. from Lons-le-Saulnier, has a population of 5980. It consists chiefly of four well-built streets, parallel to each other, and to the direction of the mountain. It is well supplied with excellent water from the numerous fountains that adorn the town. Poligny has a college, manufactures of pottery, casks, saltpetre, and oil, also iron-works, dyehouses, tan-yards, and hydraulic saw-mills. Marble and alabaster are quarried in the neighbourhood. The tribunal of first instance is at *Arbois*, a pretty town 5 miles to the northward, the birthplace of Pichegru. Arbois has a college and 7000 inhabitants, who manufacture paper, oil, and leather, and trade in the excellent white wines of the district. There are iron-works, hydraulic saw-mills, nitre-works, and nurseries at Arbois. *Champagnole*, a well-built town, with 3276 inhabitants, situated at the foot of Mont-Rivel, on the right bank of the Ain, and near the village and extensive iron-works of *Sirod*, is a place of some commercial activity. It has a large iron-wire factory, hydraulic saw-mills, naileries, &c. *Salins*, 8 miles N.E. from Poligny, situated on the slope of a hill above the Furieuse, and near a narrow gorge between two high mountains, has a college, a handsome church dedicated to St.-Anatole, and 7481 inhabitants. In the centre of the town are numerous salt-springs, and one of the greatest salt-works in France, which are inclosed by thick walls, flanked with towers, and extending 306 yards in length by 100 in breadth. Sulphate of soda, brandy, and leather are also manufactured, and in the neighbourhood there are gypsum-quarries, paper-mills, and iron-works.

In the arrondissement of St.-Claude, the chief town, *St.-Claude*, situated between three wooded and rocky mountains, at the confluence of the Tacon with the Bienne, which is here crossed by a suspension-bridge, and at a distance of 28 miles S. by E. from Lons-le-Saulnier, has tribunals of first instance and of commerce, a college, and 5270 inhabitants. The town, which is the residence of the bishop of St.-Claude, is well built, and ornamented with some pretty promenades and handsome fountains. The cathedral church of St.-Pierre is the principal building. The town is famous for turnery in bone, ivory, horn, and wood; buttons, tobacco, and musical boxes, wind instruments, combs, hardware, pins, crape, cotton-yarn, leather, paper, tiles, and pottery are also manufactured. *Morez*, on the Bienne, is situated in a gorge formed by two mountains, which rise almost perpendicularly to the height of 1200 feet, and scarcely leave room between their naked sides for two rows of houses and the street that separates them. The population amounts to 2726, who maintain themselves by manufacturing iron, iron-wire, cotton yarn, leather, and watch and clock movements.

In the arrondissement of Dôle the chief town is Dole.

The department forms the see of the bishop of St.-Claude, is included in the jurisdiction of the Cour Royale and University Academy of Besançon, and belongs to the 6th Military Division, of which Besançon is head-quarters. To the Chamber of Deputies it used to return 4 members; it now has 8 representatives to the National Assembly.

(*Dictionnaire de la France; Annuaire pour l'An* 1849.)

JURA MOUNTAINS, the name given to a mountain system which consists of several parallel chains extending along the frontiers of France, Savoy, and Switzerland, in a direction from S.S.W. to N.N.E. from the Rhône and the Lake of Geneva to the left bank of the Rhine, towards the north, where it is connected by some lower elevations with the Vosges. The length of the system is about 180 miles; the breadth varies from 30 to 50 miles. The highest summits of the Jura Mountains are found in the most eastern chain, which is connected with the Bernese Alps and extends between France and Switzerland; the other chains diminish in height towards the west, and do not form continuous unbroken ranges, but rather consist of isolated elevations, connected at their bases. Very few of the valleys among these mountains are transversal; most of them run in the direction of the length of the chains. The highest points in the crest of the eastern chain are those of Reculet, Tendre, La-Dôle, and Colombier, which rise respectively to 5959, 5543, 5513, and 5494 feet above the sea level; the mean height of this chain is about 4800 feet. The highest point in the second chain does not much exceed 4300 feet. The highest part of these mountains, which is full 3000 feet lower than the line of perpetual snow on the Alps, is covered with forests of pine and other resinous trees; further down, the beech, the ash, the lime, and the oak flourish; and the lower slopes are occupied with vineyards or cultivated for the production of maize or barley. The mountains also abound in excellent pasture, on which great numbers of cattle are reared and fed, and a great quantity of cheese is made. [Jura, Department.] Wolves are common; the brown bear and the wild cat are said to be met with, but rarely.

On the eastern side the chains of the Jura present in general steep abrupt sides, but on the west they slope down by almost insensible degrees. They are composed of a hard gray limestone mixed with alternate beds of marl and clay; in some places alabaster, gypsum, asphalte, coal, marble, and petrifactions of various kinds, especially those called oolites, are found. Iron mines, sulphurous and salt springs, abound; stalactitic grottoes and waterfalls are numerous; among the latter is the magnificent Saut du Doubs. [Doubs.] An important and interesting feature of the Jura system is the number of erratic stone blocks that are found high up the eastern slopes, at points opposite the opening of the great valleys which descend from the high Alps. Various theories have been proposed to account for the appearance of these massive blocks of a different kind of stone to that which prevails in the Jura; of these the theory of Venturi and Agassiz, who respectively ascribe the transfer of these blocks to floating

ice and to glaciers at some long distant epoch, seems the most probable.

JURIEU, PIERRE, born in 1637, was the son of a Protestant minister at Mer, in the diocese of Blois. When of age to enter the ministry, he succeeded his father in his pastoral office. His reputation for learning afterwards obtained for him the situation of Professor of Theology and the Hebrew language at Sedan. When in 1681 the Protestants were deprived of the permission to give public instruction in that town, he retired to Rouen, and from thence went to Rotterdam, where he was appointed Professor of Theology. In that city the ardour of his zeal soon drew him into controversy with Bayle, Basnage, Saurin, Bossuet, and others, and in the dispute he evinced great want of temper and of candour; but, with all these defects, Jurieu stands deservedly high as a controversialist, and his private character was irreproachable; his learning was most profound, he is generally exact in the citation of his authorities, and he had a special talent in discovering the weak point in the cause of his antagonists. In respect of style and eloquence he is immeasurably behind Bossuet, but he is at least his equal in polemical talent, and by some is considered his superior in erudition. Jurieu's private life was becoming that of a Christian minister: he was charitable to the poor almost beyond his means, and he employed the great influence he possessed with the foreign courts in alleviating the distresses of his exiled brethren. He died at Rotterdam, January 11th, 1713. His works, which are very numerous, were extremely popular in their day, and many of them are still held in high estimation by theologians of every school, on account of the great learning which they display.

JURISDICTION. This term is the Latin word Jurisdictio, which simply signifies the 'declaration of jus or law.' He who had jurisdictio was said 'jus dicere,' to 'declare the law.' The whole office (officium) of him who declared the law was accordingly expressed by the word Jurisdictio. (Dig. 2, tit. 'De Jurisdictione.') Jurisdictio was either voluntary (voluntaria) or litigant (contentiosa). The jurisdictio voluntaria related to certain acts, such for instance as those forms of manumission and adoption which must be done before a magistratus in order to be valid. The jurisdictio contentiosa related to litigation, and such legal proceedings were said to be 'in jure,' before the magistratus, as opposed to the proceedings before a judex, which were said to be 'in judicio.' The magistratus was said 'jus dicere,' or 'reddere,' when he exercised his functions; and 'magistratus' and 'qui Romæ jus dicit' are accordingly convertible terms.

Jurisdiction in England means an authority which a court of law or equity has to decide matters that are litigated before it, or questions that are tried before it.

The courts at Westminster have jurisdiction all over England and Wales; but the jurisdiction of other courts is limited by being confined to certain limits of space and to certain kinds of causes or matters in dispute. When the jurisdiction of a court extends all over England, it may still be limited as to the kind of causes which it tries. Thus the superior courts of law and the courts of equity have their several jurisdictions as to matters which they hear and determine. The ecclesiastical courts also have their separate jurisdiction; and other courts, such as the Court of Insolvency, Borough Courts, and others, have their several jurisdictions. If proceedings are commenced against a man before a court which has no jurisdiction in the matter brought before it, the defendant may answer by alleging that the court has no jurisdiction; which is called pleading to the jurisdiction. When a party is convicted by a court that has no jurisdiction in the matter, the proceedings may be moved into the Court of Queen's Bench by the writ of Certiorari and quashed.

JURISPRUDENCE, from the Latin *Jurisprudentia*, which signifies 'a knowledge of law.' Persons who were skilled in the law were called by the Romans *jurisprudentes*, or simply *prudentes;* and sometimes *jurisconsulti*. Jurisprudence means more than being simply acquainted with the rules of law, as they exist in any given system: it means such an acquaintance with them as implies a knowledge of the law as a whole or system, a knowledge of the several parts, of their relation to one another, and to the whole. The Roman jurisprudentes, who were writers on law, gave to the several rules of law which related to any given division of the whole matter a certain order and consistency; they developed, and explained, and arranged that which existed as an incoherent mass. Their influence on the development of law was great, both directly and indirectly; and the compilation of Justinian, called the 'Digest,' or 'Pandect,' which is entirely composed of extracts from the writings of the Roman jurists, gave to their opinions the force of law in the Roman empire. The Roman jurists also wrote institutional or elementary treatises on that part of the law which they called Privatum Jus, of which the 'Institutiones' of Gaius are an example.

Jurisprudence generally, or general jurisprudence, is conversant about those principles which are inseparable from all systems of law, or common to all systems of law; for, however systems of law may differ in fact, and however much they may appear to differ in form, there are fundamental principles which are common to all. The notion of possession, of property, of things which can be objects of property, of most of the ordinary contracts of life, of testaments, of intestacy, and the like, are essentially the same. The notions of person, natural and artificial, of right, of duty, and many other things, are universal, and necessarily the same. It is the business of general jurisprudence to explain all these common notions, and to reduce the whole matter which they comprehend to some general form or system, with which all particular systems of positive law may be compared. This has been done in various ways by various writers; but the best examples that we have are by the German writers on law. When general jurisprudence becomes a regular part of a law student's

discipline, it will lead to a more comprehensive study of the matter of our own law, to a more correct conception of its parts, and their relations to one another; and consequently to a nearer approximation of the particular law of England to the true measure or standard of general law, in those cases in which our particular system deviates from it. The study of general jurisprudence would be a sure though a slow corrective of many of the evils under which our actual society suffers.

JURY is an assembly of men authorised to inquire into or to determine legal facts, and bound by an oath to the faithful discharge of their duty. The etymological derivation of the term is obviously from *juro*, to swear, whence we find this institution called in law Latin *jurata*, and the persons composing it *jurati*; in French *les jurés*, and in English *the jury*. In English law, when the object is inquiry only, the tribunal is sometimes called an inquest or inquisition, as in the instance of a grand jury or coroner's inquest; but, when facts are to be determined by it for judicial purposes, it is always styled a jury. When the trial by jury is spoken of in popular language at the present day, it signifies the determination of facts in the administration of civil or criminal justice by twelve men sworn to decide facts truly according to the evidence produced before them.

Inquiry into facts on behalf of the crown by means of juries was frequent in England long before the trial by jury was commonly used in courts of justice for judicial purposes. Besides these juries of inquiry (*inquisitoria jurata*), there were accusatory juries (*jurata delatoria*), who presented offences committed within their district or hundred to the king or his commissioned justices. These inquests were immediately connected with the administration of justice, their duty being to charge offenders, who, upon such accusation, were put upon their trial before judges, and were afterwards condemned or 'delivered' by them according to the result of the trial. Though the character and duties of these accusatory juries are involved in much obscurity, there is little doubt that they formed the origin of our present grand juries. The number of persons composing juries of inquiry and accusatory juries was arbitrary, and might consist of more or occasionally of fewer than twelve men.

The third species of jury is the institution by which disputed facts are to be decided for judicial purposes in the administration of civil or criminal justice, and which is in modern times familiar to us under the denomination of *trial by jury*. The time at which this species of trial originated in England has been the subject of much discussion; and the question, whether it was known to the Anglo-Saxons, or was introduced by the Conqueror, has been warmly debated.

The traces of the trial by jury, in the form in which it existed for several centuries after the Conquest, are more distinctly discernible in the ancient customs of Normandy than in the few and scanty fragments of Anglo-Saxon laws which have descended to our time. The trial by twelve compurgators, which was of canonical origin and was known to the Anglo-Saxons and also to many foreign nations, resembled the trial by jury only in the number of persons sworn. Besides this, the trial by compurgators, under the name of Wager of Law, continued to be the law of England until it was abolished, in 1833, by the Statute 3 & 4 Will. IV., c. 42, s. 13, and is treated by all writers and noticed in judicial records ever since the Conquest as a totally different institution from the trial by jury. The trial *per sectatores* or *per pares* in the county court, which has sometimes been confounded with the trial by jury, was in truth a totally different tribunal. The sectatores or pares were, together with the sheriff or other president, judges of the court, as are the suitors in the county courts at the present day. But the incidents of the mode of trial prevalent in Normandy long before the Conquest correspond in a striking manner with those of our trial by jury as it existed for centuries afterwards. Thus in Normandy offenders were convicted or absolved by an inquest of good and lawful men summoned from the neighbourhood where the offence was surmised to have been committed. The law required those to be selected to serve on such inquest who were best informed of the truth of the matter; and friends, enemies, and near relatives of the accused were to be excluded. These incidents, though unlike our present mode of trial, are nearly identical with the trial by jury as it is described first by Glanville and afterwards by Bracton, and correspond almost verbally with the form of the jury process, which has continued to the present day, by which the sheriff is commanded to return 'good and lawful men of the neighbourhood, by whom the truth of the matter may be better known, and who are not akin to either party, to recognise upon their oaths, &c.' On the other hand (as Madox remarks, in his 'History of the Exchequer,' p. 122), 'if we compare the laws of the Anglo-Saxon kings with the forms of law process collected by Glanville, they are as different from one another as the laws of two several nations.'

Though there are some traces of the trial by jury in the four reigns which immediately succeeded the Norman Conquest, it was not till a century afterwards, in the reign of Henry II., that this institution became fully established and was reduced to a regular system. The law of Henry II. introduced the trial by assize or jury in real actions as a mode of deciding facts which the subject might claim as a matter of right. In the reign of John we first begin to trace the use of juries for the trial of criminal accusations. It is quite clear, however, from Bracton and Fleta that at the end of the thirteenth century the trial by jury in criminal cases had become usual, the form of the proceedings being given by them in detail. (Bracton, p. 143.) Introduced originally as a matter of favour and indulgence it gained ground with advancing civilisation, gradually superseding the more ancient and barbarous customs of battle, ordeal, and wager of law, until at length it became, both in civil and criminal cases, the ordinary mode of determining facts for judicial purposes.

It is a popular error that the stipulation for the *judicium parium* in Magna Charta referred to the trial by jury. Sir Edward Coke, in his commentary upon Magna Charta, expressly distinguishes between the trial by peers and the trial by jury (2nd Inst. 48 9); but Blackstone says, 'The trial by jury is that trial by the peers of every Englishman, which, as the grand bulwark of his liberties, is secured to him by the Great Charter.' ('Commentaries,' vol. iv. p. 349.) This is confounding two distinct modes of trial. The *judicium pariuin* was the feudal mode of trial, where the *pares* or *convassalli ejusdem domini* sat as judges or assessors with the lord of the fee to decide controversies arising between individual *pares*.

Until about the reign of Henry VI. the trial by jury was a trial by witnesses. The present form of the jurors' oath is that they shall 'give a true verdict, *according to the evidence*.' At what precise time this form was introduced is uncertain; but, for several centuries after the Conquest, the jurors both in civil and criminal cases were sworn merely to *speak the truth*. Hence their decision was accurately termed *verdictum*, or verdict; whereas the phrase 'true verdict' in the modern oath is not only a pleonasm, but is etymologically incorrect, and misdescribes the office of a juror at the present day.

The earliest traces of the examination of witnesses or of evidence being laid before juries in England, which formed the commencement of a total change in their character, occur in the reign of Henry VI. The change was introduced by slow degrees, and, though distinctly discernible in the reign of Henry VI., was not completely effected before the times of Edw. VI. and Mary.

This view of the original character and office of the jury seems to account for the practice of fining or otherwise punishing juries by the court when they gave an unsatisfactory verdict,—a practice which was partially continued, though not without remonstrance by legal authorities, after the nature of the institution had been changed. If juries, who were merely witnesses sent for to inform the court of facts which they were presumed certainly to know, returned a wilfully false verdict, they were guilty of a contempt of justice, and might properly be punished; but, when their character was changed, and their verdict depended not on their own knowledge of the facts, but upon the impressions produced on their minds by the evidence, such a course of summary punishment became intolerable injustice, and, though occasionally practised in the sixteenth century, was declared to be illegal soon after the Restoration by the celebrated judgment in Bushell's case, reported in Vaughan's Reports, p. 135.

The juries now in use in England in the ordinary courts of justice are grand juries, petty or common juries, and special juries. Grand juries are exclusively incident to courts of criminal jurisdiction; their office is to examine into charges of crimes brought to them at assizes or sessions, and, if satisfied that they are true, or at least that they deserve more particular examination, to return a bill of indictment against the accused, upon which he is afterwards tried by the petty jury. A grand jury must consist of twelve at the least; but in practice a greater number usually serve, and twelve must always concur in finding every indictment. No further qualification is required for grand jurors (except in the case of grand jurors at the sessions of the peace, provided for by the recent Jury Act) than that they should be freeholders, though to what amount is uncertain; or freemen, lawful liege subjects, and not aliens or outlaws.

Until the end of the thirteenth century the only qualification required for petty or common juries, for the trial of issues in criminal or civil courts, was that they should be 'free and lawful men;' *freemen*, as holding by free services or free burgesses in towns; and *lawful* men, that is, persons not outlawed, aliens, or minors, but entitled to the full privileges of the law of England. The Statute 6 George IV. c. 50, entirely remodelled the law respecting juries. By this statute 'every man (with certain specified exceptions) between the ages of twenty-one years and sixty years, who has within the county in which he resides 10*l*. a year in freehold lands or rents, or 20*l*. a year in leaseholds for unexpired terms of at least twenty-one years, or who, being a householder, is rated to the poor-rate in Middlesex on a value of not less than 30*l*., and in any other county of not less than 20*l*., or who occupies a house containing not less than fifteen windows, is qualified and liable to serve on juries in the superior courts at Westminster and the courts of the counties palatine for the trial of issues to be tried in the county where he resides, and also to serve on grand juries at the sessions of the peace, and on petty juries, for the trial of issues triable at such sessions in the county in which he resides.' The exceptions are:—peers, judges of the superior courts, clergymen, Roman Catholic priests, dissenting ministers following no secular employment but that of a schoolmaster, serjeants and barristers at law, and doctors and advocates of the civil law actually practising; attorneys, solicitors, and proctors actually practising; officers of courts, actually exercising the duties of their respective offices; coroners, gaolers, and keepers of houses of correction; members and licentiates of the college of physicians actually practising; surgeons, being members of one of the royal colleges of surgeons in London, Edinburgh, or Dublin, and actually practising; apothecaries certificated by the Apothecaries' Company, and actually practising; officers in her majesty's navy or army on full pay; pilots licensed by the Trinity House; masters of vessels in the buoy and light service; pilots licensed by the lord-warden of the cinque-ports, or under any act of parliament or charter; household servants of the sovereign; officers of customs and excise; sheriffs' officers, high constables, and parish clerks.

Lists of all persons qualified to be jurors are made out by the churchwardens and overseers of each parish, and fixed on the church door for the first three Sundays in September in each year; these are afterwards allowed at a petty sessions, and then delivered to the high constable, who

returns them to the next quarter-sessions for the county. The clerk of the peace then arranges the lists in a book, which is called the 'Jurors' Book' for the ensuing year, and afterwards delivers it to the sheriff. From this book the names of the jurors are returned in panels to the different courts.

Special juries are composed of such persons as are described in the 'Jurors' Book' as esquires, and persons of higher degree, or as bankers or merchants; and it is the duty of the sheriff to make a distinct list of such persons, which is called the 'Special Jurors' List.' When a special jury is ordered by any of the courts, which must always be the result of a special application of one of the parties, 48 names are taken by ballot from this list in the manner particularly described in the statute, which are afterwards reduced to 24 by means of each party striking out 12; and the first 12 of these 24 who answer to their names in court are the special jury for the trial of the cause.

The mode of objecting to a jury by the parties is by challenge. Challenges are of two kinds: challenges to the *array*, and challenges to the *polls*. The challenge to the array is an objection to the whole panel or list of jurors returned for some partiality or default in the sheriff or the under-sheriff by whom it has been *arrayed*. Challenges to the polls are objections to particular jurors, either on the ground of incompetency (as if they be aliens, or of insufficient qualification within the provisions of the Jury Act, 6 Geo. IV. c. 50), or of bias or partiality, or of infamy, as having been convicted of some infamous crime. Upon these challenges the cause of objection must in each case be expressly shown to the court; but in trials for capital offences the accused is entitled to challenge *peremptorily* (that is, without giving any reason) thirty-five jurors. The king however, as nominal prosecutor, has no right of peremptory challenge, though he is not compelled to show his cause of challenge until the panel is gone through, and unless a full jury cannot be formed without the person objected to.

One of the jury is appointed the foreman, and he generally pronounces the verdict of the jury to the judge in court.

The trial by jury, originally established in France in criminal cases by the National Assembly, was retained in the French code. An account of the proceeding and of the qualifications and formation of the jury will be found in the 'Code d'Instruction Criminelle,' liv. ii. tit. 2, chaps. iv. and v. [Codes, Les Cinq.]

Anciently in Scotland all offences were tried by juries; at present all prosecutions of a higher nature must proceed by an assize or jury of 15 men, who determine their verdict by a majority of voices. In 1815 a statute (55 Geo. III. c. 42) was passed, which established a jury court, not as a separate and independent tribunal, but as subsidiary to the court of session, for the trial of particular questions of fact to be remitted for trial by the judges of the court of session at their discretion. It was provided by the act that, if the jury are not unanimous in 12 hours, they shall be discharged, and a new trial granted. The judges of this court, called the 'Lords Commissioners of the Jury Court in Civil Cases,' are appointed by commission, and consist of a chief judge and two other judges. The Stat. 59 Geo. III. c. 35, which recites that the introduction of the trial by jury in civil cases by the former act had been found beneficial, enacts a variety of improvements in the machinery of the jury courts, and makes them a permanent part of the judicial establishment of Scotland. By the Stat. 2 Geo. IV. and 1 Will. IV. c. 69, the jury court as a separate tribunal was abolished, and the trial by jury was united with the ordinary administration of justice in the court of session.

JUSSIEU, ANTOINE LAURENT DE, an eminent French botanist, was born at Lyon in 1748. He arrived in Paris in 1765 for the purpose of completing his education as a medical practitioner, and in 1770 he was nominated botanical demonstrator in the Jardin du Roi. Shortly afterwards he drew up a memoir upon a new method of arrangement, which was read before the Academy of Sciences, and which was afterwards carried into effect in the Garden.

From 1774 to 1789, De Jussieu was constantly occupied in demonstrating to his class of botany and, as his new method was thus brought perpetually before him, with all its advantages and disadvantages in practice, he was able to alter and improve it yearly. The result was the following scheme, under which were arranged all the natural orders known to the author:—

Index Methodi
Ordines Naturales complectentis.

Acotyledones				Class
Monocotyledones		Stamina hypogyna		,,
		,, perigyna		,,
		,, epigyna		,,
Dicotyledones	Apetalæ	Stamina epigyna		,,
		,, perigyna		,,
		,, hypogyna		,,
	Monopetalæ	Corolla hypogyna		,,
		,, perigyna		,,
		,, epigyna	Antheris connatis	,,
			Antheris distinctis	,,
	Polypetalæ	Stamina epigyna		,,
		,, hypogyna		,,
		,, perigyna		,,
	Diclines irregulares			,,

In the state of science when this system was promulgated its excellence was most remarkable, nor is it certain even now in what way it can be best improved.

His 'Genera Plantarum' is now obsolete, but to the last day of his existence Jussieu preserved that brilliant combination of sound philosophical principles with a profound knowledge of facts which has placed him so far above all his countrymen as a botanist.

In 1789, when the 'Genera Plantarum' was published, the political state of France turned the public from all thoughts of botany, and compelled Jussieu to mingle in the busy scenes of public life. In 1790 he was made a member of the municipality of Paris, and was charged with the direction of the hospitals and charities of that city, which he continued to exercise till 1792. In 1793 the Jardin du Roi was reorganised under the new name of Jardin des Plantes; and De Jussieu, who had been previously botanical demonstrator, became professor of rural botany. He afterwards became director and treasurer of the Museum of Natural History, and recommenced, in 1802, his botanical writings. These, amounting in number to fifteen, were continued in the 'Annales du Museum' till 1820. He was then seventy-two, and was no longer able to do more than profit by the observations of others. Nevertheless he employed himself between his eighty-third and eighty-eighth year in dictating a new edition of his 'Introductio in Historiam Plantarum.' This work has been published since his death; it is written in elegant Latin. He died, after a short illness, on September 15, 1836.

JUSTICES OF THE PEACE are persons appointed to keep the peace within certain prescribed limits, with authority to act judicially in criminal causes, and in some of a civil nature arising within those limits, and also to do certain other things in which they act not judicially but ministerially, *i. e.* as servants of the crown performing official acts in respect of which they are intrusted with no judicial discretion. The authority of justices of the peace is derived from the king's prerogative of making courts for the administration of the law, or is created by different statutes; their duties are expressed in the royal commission appointing them to the office, or are prescribed by those statutes.

Justices of the peace are appointed either by act of parliament, by royal charter (in the case of justices in boroughs not within the Municipal Corporation Act, the charter usually appointing certain municipal officers to be justices, and prescribing the manner in which vacancies in the offices are to be filled up), or by a commission from the crown under the statute of 1 Edward III. The form of the commission of the peace has from time to time been altered, and the authority of the justices enlarged. As now framed, it consists of two distinct parts, and contains two separate assignments or grants of authority. Of these the former gives to any one or more justices not only all the power relating to the maintenance of the peace which was possessed by the conservators at common law, but also all the additional authority mentioned in the statutes. The latter assignment defines the power of justices when the whole body, or such of them as choose to attend, act together in general sessions. [Sessions.]

Justices appointed by act of parliament or by the king's charter are not removeable except for misconduct; but the authority of a justice appointed by the king's commission may be determined at the pleasure of the crown, either directly by writ under the great seal, or impliedly, by making out a new commission, from which his name is omitted. But, until notice of the revocation of the authority, or publication of a new commission, the acts of the ex-justice are valid in law, and the warrant of a justice remains in force until it be executed, although he die before its execution. The commission is also determined by the death of the king by whom it was issued; but now, by 6 Anne, c. 7, s. 8, all offices, civil and military, are to continue for six months after the demise of the crown, unless sooner determined.

Justices of the peace have in general no authority over matters arising out of the district for which they are appointed, but they may secure the persons of those who are charged before them with felony or breach of the peace; and by the Municipal Corporation Act, s. 111, in every borough to which the king does not grant a separate court of quarter-sessions the justices of the county within which such borough is situated are to exercise in it the same jurisdiction as in any other part of the county.

The judicial authority of a justice out of sessions is both civil and criminal—civil, where he is authorised by statute to adjudicate between master and servant, or to enforce the payment of rates, tithes, &c., or the observance of the regulations of friendly societies, &c.; criminal, where he requires surety of the peace or a recognisance for the peace or for good behaviour, or where he acts in the suppression of riots, or where he acts with summary power to decide upon the guilt or innocence of the party accused, according to the view which he may take of the evidence, and to punish the offender. But all proceedings before justices, whether civil or criminal, if removed into the Queen's Bench, are there treated as belonging to the crown side of the court.

The institution of justices of the peace has been adopted in most of the British colonies, and has with some modifications been retained in the United States of America.

JUSTICES, LORDS. The kings of England have been, ever since the Conquest, in the habit of appointing, as occasion required, one or more persons to act for a time as their substitutes in the government either of the whole kingdom or of a part of it. When William I. returned to Normandy the year after the Conquest, he left his half-brother Odo, bishop of Bayeux, and William Fitzherbert, to be *Custodes Regni*, or guardians of the realm, during his absence; and similar appointments were very frequent under the early Norman and Plantagenet kings.

The most familiar case of the appointment by the crown of a representative to exercise the supreme executive power, not in a colony or de-

pendency, is that of the appointment of a governor for Ireland, who has commonly borne the name of the Lord Lieutenant or the Lord Deputy; or of a council of government composed of Lords Justices.

In England lords justices and regencies have been repeatedly appointed since the Revolution, on occasion of the king going abroad; and the appointment has usually, if not always, been made by royal letters patent under the great seal, in the same manner as the lords lieutenant or lords justices of Ireland have always been appointed. In some cases however the aid of parliament has been called in for certain purposes. The history of the appointment of lords justices is fully stated in the 'Penny Cyclopædia,' in the article JUSTICES, LORDS.

JUSTI'CIA, a genus of acanthaceous Exogens, whose numerous species inhabit all the tropical parts of the world, preferring however damp woods to dry and open plains. It is especially in the forests of Brazil and India that they occur. Many of them are never woody, and some are bushes or small trees. A small number are valued by gardeners as objects of ornament. As now limited, Justicia scarcely contains a plant of any importance.

JUSTICIARY COURT in Scotland. The High Court of Justiciary is the supreme criminal court in Scotland. It consists of the Lord Justice General, Lord Justice Clerk, and five other judges of the Court of Session. It sits at Edinburgh, from time to time during the year, according to the extent of business to be transacted. Offences committed in Edinburgh and within the district of the Lothians are tried before this court; and, in cases where in other parts of the country waiting for the next circuit court would create too much delay, or where there is any other ground of expediency, the trial may proceed before the Central Court. Other trials in the provinces proceed before the circuit courts. These are held in spring and autumn, each by two judges deputed by the High Court of Justiciary. All cases before the Court of Justiciary are tried by a jury of fifteen, and a majority returns the verdict where they are not unanimous. It has jurisdiction in all the more serious offences, except high treason, which is adjudicated in the English manner by a Court of Oyer and Terminer.

JUSTIFICATION is used in theology to signify the acceptance of a sinner by God, and is frequently employed by the sacred writers as equivalent to the forgiveness of sin. Thus, St. Paul says, 'Be it known unto you therefore, men and brethren, that through this man is preached unto you the forgiveness of sins, and by him all that believe are justified from all things from which ye could not be justified by the law of Moses.' (Acts xiii. 38, 39.) The Protestants and Roman Catholics differ respecting the signification that should be attached to the word justification.

The *originating cause* is the love of God towards his fallen creatures. (Rom. iii. 24; Eph. ii. 8.) The *meritorious cause* is, according to the 11th article of the Church of England, and the opinion of most Protestants, 'the merit of our Lord and Saviour Jesus Christ, and not our own works or deservings' (Rom. iii. 24; v. 18; Eph. i. 7; Col. i. 14); but the Roman Catholic Church maintains that good works, penances, and the intercession of saints also contribute to our justification. The *instrumental cause* is faith in the vicarious sacrifice of Christ; since the merit of Christ's sacrifice does not produce our pardon unless we believe in its efficacy.

The consequences of justification are said to be:—1, peace with God (Rom. v. 1); 2, tranquillity of conscience; 3, adoption of the persons justified into the family of God (Rom. viii. 14–17); 4, spiritual joy, arising from the belief of our being adopted by God (Rom. xiv. 17); 5, the hope of eternal life.

JUSTINIAN'S LEGISLATION. Justinian, soon after ascending the throne, gave orders, Feb. A.D. 528, to a commission consisting of Joannes and nine other persons, among whom were Tribonian and Theophilus, to make a general compilation of the best and most useful laws, or 'constitutions,' which had been promulgated by the emperors his predecessors, beginning from Hadrian's perpetual edict down to his own time. [CONSTITUTIONS, ROMAN.] Partial compilations had been made in the time of Constantine by private individuals, Gregory and Hermogenianus, of which only fragments remain, and a more complete one was effected under Theodosius II. Joannes and his nine associates completed their task in fourteen months, and the new code, having received the imperial sanction, was published in April, A.D. 529. A few years after, Justinian, by the advice of Tribonian, ordered a revision of his code to be made by Tribonian and four others. The code thus revised was published in December of the year 534, under the title of 'Codex Justinianeus repetitæ prælectionis,' and thenceforth had the force of law. The code is divided into twelve books; every book is subdivided into titles, and each title into laws.

In the year following the publication of the first edition of his code, Justinian undertook a much more important work, the formation of something like a system of law from the writings of the Roman jurists. In December 530, he commissioned seventeen lawyers, with Tribonian at their head, with full authority to exercise their discretion as to these works, by making choice of those which they considered as the best authorities. They chose about forty out of Tribonian's library, most of them jurisconsults who had lived during that period of the empire which has been sometimes called the age of the Antonines, from Hadrian to the death of Alexander Severus. From the works of these writers, said to have amounted to two thousand treatises, the commission appointed by Justinian was to extract and compress all that was suited to form a Digest of Law. Justinian gave Tribonian and his associates ten years' time to perform their task; but they completed it in three years. The work was styled 'Digesta,' and also 'Pandectæ' ('embracing all'), and was published in December 53[illegible]. It was declared by the emperor that it should have the force of law all over the empire, and should supersede all the text-books of the

jurists, which in future were to be of no authority. The extracts from Ulpian form somewhat more than one-third of the whole work. Those from Paulus are the next in amount.

The 'Digesta' is divided into 50 books, each book being also divided into titles, and subdivided into sections. While the Digest was being compiled, Justinian commissioned Tribonian and two other civilians, Theophilus and Dorotheus, to make an abridgment of the first principles of the law, for the use of young students who should wish to apply themselves to that science. This new work, being completed, was published under the name of 'Institutiones,' about one month before the appearance of the Digest. The Institutions were mainly based on an older work of the same description and title. [GAIUS.] They are arranged in four books, subdivided into titles. The Institutes treat only of that division of law which the Romans called Privatum Jus.

A list of the Roman jurists (*Anthianus, Aquila*, &c.), from whose works the 'Pandect,' or 'Digest,' was compiled, is given in the 'Penny Cyclopædia,' article 'Justinian's Legislation.'

JUSTINIANUS, FLAVIUS, born near Sardica in Mœsia, A.D. 482 or 483, of obscure parents, was nephew by his mother's side to Justinus, afterwards emperor. The elevation of his uncle to the imperial throne, A.D. 518, decided the fortune of Justinian, who, having been educated at Constantinople, had given proofs of considerable capacity and application. Justinus adopted Justinian as his colleague; and a few months before his death he crowned him in presence of the patriarch and senators, and made over the imperial authority to him, in April 527. Justinian was then in his forty-fifth year, and he reigned above thirty-eight years, till November 565, when he died. By means of his generals, Belisarius and Narses, he completely defeated the Vandals and the Goths, and reunited Italy and Africa to the empire. Justinian was the last emperor of Constantinople who, by his dominion over the whole of Italy, reunited in some measure the two principal portions of the ancient empire of the Cæsars. The wars of Justinian's reign are related by Procopius and Agathias.

Justinian must be viewed also as an administrator and legislator of his vast empire. In the first capacity he did some good and much harm. He was both profuse and penurious: personally inclined to justice, he often overlooked, through weakness, the injustice of subalterns; he established monopolies of certain branches of industry and commerce, and increased the taxes. But he introduced the rearing of silkworms into Europe; and the numerous edifices he raised, and the towns he repaired or fortified, attest his love for the arts, and his anxiety for the security and welfare of his dominions. Procopius, 'De Ædificiis Domini Justiniani,' gives a notice of the towns, temples (St. Sophia among the rest), convents, bridges, roads, walls, and fortifications, constructed or repaired under his reign. The same Procopius however wrote a secret history ('Anecdota') of the court and reign of Justinian and his wife Theodora, both of whom he paints in the darkest colours. Theodora exercised, till her death in 548, a great influence over the mind of Justinian, and many acts of oppression and cruelty were committed by her order. But yet the 'Anecdota' of Procopius cannot be implicitly trusted, as many of his charges are evidently misrepresentations or malignant exaggerations. Justinian was easy of access, patient of hearing, courteous and affable in discourse, and perfect master of his temper. In the conspiracies against his authority and person he often showed both justice and clemency. He was chaste and temperate; his meals were short and frugal. He allowed himself little time for sleep, and was always up before the morning light. He was, or professed to be, a poet and philosopher, a lawyer and theologian, a musician and architect; but the brightest ornament of his reign is the compilation of a body of Roman law. [JUSTINIAN'S LEGISLATION.] His love of theological controversy led him to interfere with the consciences of his subjects, and his penal enactments against Jews and heretics display a spirit of intolerance which has ever since afforded a dangerous authority for religious persecution.

Justinian died at eighty-three years of age, on the 14th November, 565, leaving no children, and was succeeded by his nephew Justinus II.

(Ludewig, *Vita Justiniani Magni;* Gibbon, ch. xl.–xliv.)

JUSTINIANUS II., son of Constantine III., a lineal descendant of the Emperor Heraclius, succeeded his father on the throne of Constantinople, A.D. 685. His reign, which lasted ten years, was marked chiefly by wars with the Saracens, and by the exactions and oppressions of his ministers. At last his general, Leontius, drove him from the throne, had his nose cut off, and banished him to the Crimea, A.D. 695. Leontius however was soon after deposed himself, and banished by Tiberius Apsimerus, who reigned for seven years. Meantime Justinian had escaped from the Crimea, and married the daughter of the Kakan, or king of the Gazari, a tribe of Turks; and he afterwards, with the assistance of the Bulgarians, entered Constantinople, and put to a cruel death both Leontius and Tiberius, with many others. He ordered also many of the principal people of Ravenna to be put to death. At last Justinian was dethroned and killed by Philippicus Bardanes, A.D. 711.

JUSTI'NUS I., by birth a peasant of Dacia, in his youth enlisted in the guards of the Emperor Leo I. Under that and the two following reigns Justin distinguished himself by his military services, and gradually attained the rank of tribune, count, general, and lastly the command of the guards, which he held when the Emperor Anastasius died, A.D. 518. He was then proclaimed emperor by the soldiers, being sixty-eight years of age. Justinus, being himself uninformed in civil affairs, relied for the despatch of the official business of state on the quæstor Proclus, a faithful servant, who was also the friend of Justinian, Justin's nephew, who himself had acquired a great ascendancy over his uncle. By Justinian's advice a reconciliation was effected between the Greek and the Roman churches, A.D. 520. After a reign

of nine years, Justin abdicated in favour of his nephew, and died soon after, in A.D. 527.

JUSTINUS II., nephew of Justinian I., by his mother Vigilantia, was raised to the throne by the senators and the guards immediately after the death of his uncle, on the 15th November, A.D. 565. Soon after complaints reached Constantinople from the Romans against Narses, the conqueror of the Goths, and exarch of Ravenna, whose government had become unpopular in Italy. A new exarch, Longinus, was appointed to supersede Narses, who is said to have invited the Longobards, and their king Alboin, to invade Italy. However this may be, Alboin invaded Italy by the Julian Alps, A.D. 568, and in a few years all North Italy was lost to the Byzantine emperor. The provinces of Asia were likewise overrun by the Persians. In the midst of his difficulties, Justinus abdicated, and he chose Tiberius, the captain of his guards, as his successor. The conduct of Tiberius fully justified Justin's discernment. Justin lived four years after his abdication in quiet retirement, and died in the year 578.

JUSTINUS, the historian, is supposed to have lived under Antoninus Pius, for the preface to his History is addressed to that emperor. The passage in which the emperor's name occurs is found in the older editions, but its authenticity is disputed. Nothing else is known of his personal history. He compiled an abridgment or epitome of the Universal History of Trogus Pompeius, who lived in the time of Augustus, and which consisted of forty-four volumes, as Justin tells us in his preface. The work of Trogus is lost, except the heads of contents of each book, from which it appears that Justinus has been at times a careless abbreviator. Another charge against Justinus is the confused order in which he has narrated events; but this fault may be ascribed to the text of Trogus. Among the best of the numerous editions of Justinus may be mentioned that by Abr. Gronovius, with variorum notes and dissertations, 1719, reprinted in 1760; that of J. G. Grævius, Leyden, 1683; that of the Bipontine Society, 1802; and that of Wetzel, 1806.

JUSTI'NUS, commonly called JUSTIN MARTYR, one of the early fathers of the Christian church, was born in Palestine, at a place then called Neapolis. His father was a Greek. Justin was carefully instructed in the learning of the Grecian schools of philosophy, and in the course of his studies he visited Alexandria, then a celebrated seat of learning. With a mind deeply imbued with the Platonic philosophy, he became sensible to the truth and beauty of Christianity, and made a public profession that he received it as divine truth about A.D. 132.

During the remainder of his life he continued in the profession of Christianity, and is distinguished among the fathers of the church by the Apologies and Defences which he published. His first Apology for Christianity was addressed to the Emperor Antoninus Pius and his adopted sons, at a time when the Christians were suffering rather from popular fury than from the regular authority of the state, and it prevailed so far as to obtain for them some favourable concessions from the emperor. His second Apology was addressed to t successor of Antoninus, Marcus Aurelius, on occ sion of several Christians having been put to dea for their faith. Both these Apologies are extan as well as another work of Justin's, which is Dialogue with Trypho, a learned Jew, in defen of Christianity. Of the genuineness of the works there is no doubt. The usual place of h residence was Rome, where he was put to deat a martyr to Christian truth; but the time is u certain. He might have saved his life, if he ha consented to join in a sacrifice to the heath deities. Hence with his name has descended t addition of the Martyr.

'The Dialogue with Trypho' was edited by D Samuel Jebb, and the 'Apologies' by Dr. Charl Ashton. There is a complete edition of the worl of Justin, by Otto, 2 vols. 8vo., Jena, 1842– There are English translations of the Apologi by William Reeve, M.A., 2 vols. 8vo., 1809; an of the Dialogue by Henry Brown, M.A., 1755.

JUTES, a people who in the 5th centur appear to have been settled in the northern pa of the Danish province of Jutland, which took i name from them. [ENGLAND.]

JUTLAND, a peninsula which projects nort wards from the continent of Europe, and belon to Denmark, is bounded S. by Holstein, fro which it is separated by the Eyder and the Kiel Canal, E. by the Little Belt and the Kattegat, by the Skagerrack, and W. by the German Ocea The southern part of Jutland, extending from t frontier of Holstein to an irregular line whi crosses the peninsula from Kolding Bay to a poi on the west coast opposite the extremity of t isle of Fanöe, constitutes the duchy of SCHLESW The rest of the peninsula forms the Danish p vince of North Jutland, which is situated betwe 55° 20′ and 57° 42′ N. lat., 8° 6′ and 10° 50′ long.

North Jutland is about 170 miles long, w a breadth varying from 70 to 100 miles. The a is 9480 square miles, and the population in 18 was 576,882. Few countries have such an ext sive line of coast in proportion to their area North Jutland, which, especially on the n elevated east coast, is indented with numer bays and inlets. The most considerable of t inlets, the *Lymfiord*, extends across the n of the province, first in a western and then i south-western direction, the whole length b about 100 miles. It contains numerous isla the largest of which, called Mors, has an of 136 square miles. In the year 1825 North Sea broke through the narrow strip land between it and the Lymfiord, and, the br being gradually enlarged, the northern part of land is now an island. The apparent advan of this extensive line of coast is much dimini by the shallowness of the sea, and the innu rable little islands, sand-banks, and shoals, w render access difficult. The west coast is dered by a chain of sand-hills, within which are many good pastures. The southern pa the west coast is alluvial soil, extremely fertile swampy and unhealthy, and requiring dikes to tect it from the inroads of the German O

he east coast is more elevated. The peninsula rminates northwards in the promontory of Ska-n, from which a line of low hills runs through the hole length of Jutland. The rivers are very all; lakes are numerous. The productions are rn, hemp, flax, tobacco, and some timber. The rses are large. The breed of black cattle is od, and numbers of them and of hogs are ex-rted to Holstein. Fish and game are abundant. he climate is very variable, with frequent fogs nd rains; the winters are not very rigorous, but e summer is often extremely hot. Jutland has elonged to Denmark since about 850. It is one f the few peninsulas that project northwards.

The peninsula is divided into four districts or *ifts*, each of which forms a bishop's see, and is amed from the chief town in each:—Aalborg in he north, Aarhuus in the east, *Viborg* in the entre, and *Ripen* in the south and west. The own of *Viborg* is situated on a small lake nearly n the centre of the peninsula, and has 4000 in-abitants. It is surrounded with ramparts, has ix gates, and is pretty well built. The town of *Ripen*, or *Ribe*, is a walled town with 3000 in-abitants. It is situated on the Rips, two miles rom the German Ocean, within the territory of chleswig. Only small vessels can come up to he town. The fortress of *Fredericia*, which com-nands the northern entrance to the Little Belt, is n this diocese; the town as 4700 inhabitants, 4 hurches, a synagogue, a custom-house and several anufactories. [Belt.]

In the article Iceland, it is stated that 'it fol-owed the fortunes of Norway.' This is an error: s previously stated in Denmark, Iceland still ppertains to Denmark.

JU'VENAL. His name is variously written *Decius* (or *Decimus*) *Junius Juvenalis*. His birth-lace was perhaps Aquinum, a Volscian town; nd he is said to have been born somewhere about A.D. 40, under Caligula, and to have died, turned of 80, under Hadrian. He is probably the person whom Martial has addressed in his Epigrams, (vii. 24, 91; xii. 18). In fact, nothing certain is known about him.

The relative merits of Juvenal and Horace as satirists have been warmly contested. It is a question on which men will form opposite opinions, as their tempers are more fit to relish brilliancy and playfulness, or earnest and dignified declamation. Juvenal is said to have spent much time in attendance on the schools of the rhetoricians; and the effect of this, in an age not remarkable for purity of taste, may be observed in a tendency to hyperbolical inflation, both of thought and style, which would soon betray a writer of less power into the ridiculous. From this his wit, command of language, and force and fulness of thought completely preserve him. Still perhaps he would produce more effect if the effort to do his utmost were less apparent. His writings are addressed to the encouragement of virtue no less than to the chastisement of vice; and parts of them have been recommended by Christian divines as admirable storehouses of moral precepts. Still they lie open to the objection of descending so minutely into the details of vice as to minister food as well as physic to the depraved mind. To the scholar they are invaluable for the information which they supply concerning private life among the Romans. The editions of Juvenal are very numerous; that of Ruperti, which has been much used in England, has a copious but not a valuable commentary. The edition of Heinrich, 8vo., Bonn, 1839, has a useful body of notes. He is translated into English by Holiday, Dryden (who however only translated five satires of the edition which bears his name), Gifford, and Hodgson. The French prose translation of Dusaulx is highly praised.

JUVENTIUS, CELSUS. [Celsus.]

JYNAGHUR. [Rajpootana.]

JYNTEA. [Silhet.

K has the same sound which C has before the vowels *a*, *o*, *u*. A reference to that consonant will therefore suffice for the power of the letter. Although this letter is now superfluo,su it was not so when the characters of an alphabet were syllabic in power. Thus the letter *k* appears to have denoted at one time the syllable *ka*, while another character represented *ko*, and so on. Hence in the Greek and Hebrew alphabets the former was called *kappa*, *kaph*; the latter *koppa*, *koph*. This accounts for the fact, that in Latin the letter *k* was never used except before the vowel *a*, precisely as *q* is found only before *u*, and the Greek koppa only before *o*. Even our own alphabet seems to imply such a limit in the use of this consonant, when it gives it the name *ka*, not *ke*, though the latter name would better agree with *be*, *ce*, *de*, &c.

The following are some of the Latin words in which the letter *k* is found in inscriptions: Kaeso, Kaia, kalendae, kandidatus, Kaninius, kanus, kapitolium, kaput, karcer, Karmenta, Kartago, karus, kasa, Kastor, kasus, kastra, and arka, dedikare, iudikare, Parka, Volkanus.

KABOOL. [Afghanistan.]

KABYLES. [Algiers.]

KAEMPFER, ENGELBERT, was born Sept. 16, 1651, at Lemgo, in the principality of Lippe-Detmold, in Germany. He passed through several schools, and finally studied at the university of Cracow for three years, and at Königsberg for four years more. From Prussia he went to Sweden, where he solicited and obtained the place of secretary to an embassy which was then going to Persia. In 1684 the embassy arrived at Ispahan, then the capital of Persia. The information which Kaempfer collected during his travels and his residence in Persia is embodied in his 'Amœnitates.' When the embassy returned to Europe in 1685, Kaempfer entered as surgeon into the service of the Dutch East India Company, served in the Persian Gulf, and, sailing from Bender Abassi, in 1689, for Batavia, visited most of the countries on the western shores of Hindustan. At Batavia he occupied himself chiefly with the natural history of the island of Java. In 1690 he went from Batavia to Japan, as physician to the embassy which the Dutch East India Company annually sent to the Japanese court. He remained at Nagasaki, in Japan, from September 1690 to November 1692, and during this time he accompanied two embassies to Yeddo. His observations on Siam and Japan are given in his great work entitled 'The History of Japan,' the original of which has never been published, but a translation was made from a copy in the possession of Sir Hans Sloane by J. G. Scheuchzer, and published in England in 2 vols. fol., 1727. Kaempfer returned from Japan to Batavia, which he left in 1693 for Amsterdam. In April 1694 he took the degree of doctor of physic at the university of Leyden. On his return to his native place, he was appointed physician to his sovereign. He died Nov. 2, 1716.

KÆMPFE'RIA, a small genus of Indian *Scitamineæ*, or *Zingiberaceæ* of some authors, of which the species are indigenous to the islands of the Archipelago and the southern parts of the continent of India, as Bengal and the districts on its eastern frontier.

KAFFA, called also *Feodosia*, is a town built on the south-eastern shores of the Crimea, in 45° 2′ N. lat. and 35° 20′ E. long., on a wide open bay, which is more than twenty miles across. The town stands on the most western angle of this bay, and its harbour is protected by a projecting cape. In ancient times the town was called *Theodosia*, and was one of the towns of the Greek kingdom of the Bosporus. According to the author of the 'Periplus of the Euxine,' it was a Milesian colony.

In 1474 Kaffa was taken from the Genoese by the Turks, but still continued a considerable place, though its population had decreased from 80,000, which it is stated to have had when the commerce of the Genoese was most flourishing, to 20,000 individuals. The wars which the Russians, in the latter half of the last century, carried on in these parts, ruined Kaffa, and still more the emigrations which took place when the Russians got possession of the town. Towards the end of the last century Pallas describes it as a heap of ruins, inclosed by strong and lofty walls, which were fortified by towers, at the distance of 20, 40, and 60 fathoms from each other. In this ruined state the town with a population which probably does not exceed 5000, remained up to the year 1806, when Russia tried to raise it again by declaring it a free harbour; but this attempt seems to have had little effect. Fishing is the principal occupation of the inhabitants.

KAHIRA, or CAIRO, more properly *El Ckáhireh*, which was its former name, but now called by the natives *Masr*, the capital of modern Egypt, is situated in 30° 5′ N. lat., and 31° 20′ E. long., between the eastern bank of the Nile and the ridge of Mokattam, and near the apex of the Delta of the Nile. Kahira occupies about three square miles. It is surrounded by a wall, the gates of which are shut at night, and is commanded by a large citadel situated at an angle of the town, on one of the lower elevations of the contiguous ridge, in which is the residence of the Pasha. The streets are unpaved, irregular

and narrow. The great thoroughfare streets have generally a row of shops on each side. Above the shops are apartments which do not communicate with them, and which are inhabited by private families. Most of the by-streets have a wooden gate at each end, closed at night, and guarded by a porter within, who opens it to persons who require admittance. The houses in general are two or three stories high, and most of them inclose an open unpaved court, into which the principal apartments look. In the court is a well of slightly brackish water, which filters through the soil from the Nile.

There are in the town three or four squares or open places of considerable extent, two of which are overflowed during the high floods of the Nile. Among the numerous mosques, four are distinguished for their size and architecture—that of Tooloon, which dates from the ninth century of our æra; that of El Hakim; that of El Azhar, with a splendid dome, and a college attached to it; and, lastly, the mosque of Hhasaneyn, with its high dome, its two lofty minarets, and its marble and other ornaments. Among the other remarkable buildings are the public baths, of which there are between sixty and seventy in the town, several of them very spacious, handsomely ornamented and painted, externally and internally, the various apartments being paved with marble. The coffee-houses, which are very numerous, are extremely plain and unadorned. There are numerous *wekalehs*, or merchants' depôts. The public gardens consist of groves of orange and lemon trees and vines; and the cemeteries, both within and without the town, are also frequented as promenades.

The population of Kahira is reckoned at 240,000 inhabitants, of whom about 190,000 are native Mussulmans, 10,000 Copts, between 3000 and 4000 Jews, and the rest strangers from various countries.

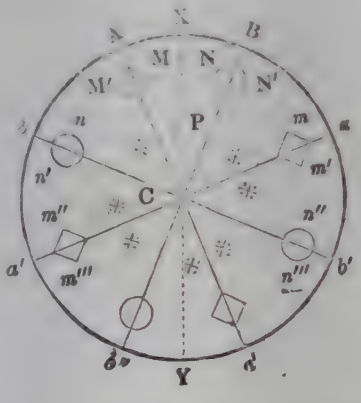
In the neighbourhood of Kahira are—Boolak, with the custom-house, the bazaar, the printing-press, a school or college, some silk manufactories, and about 18,000 inhabitants; Musr el Ateeckah, where the town of Fostat, or Old Kahira, once stood, and where the vast granaries are now seen; Schoobra, with a country-house and fine gardens of the Pasha; Aboo Zabel, where is a school of medicine, anatomy, and surgery, and a large military hospital, all created by Mehemet Ali. Nearly opposite Kahira, on the left bank of the Nile, are the great pyramids of Jizeh.

Kahira still maintains the reputation of being the best school of Arabic literature; and for Mohammedan theology and jurisprudence the fame of its professors remains unrivalled. Schools of various kinds are very numerous.

(Lane's *Account of the Manners and Customs of the Modern Egyptians;* Wilkinson; Minutoli.)

KALEIDOSCOPE, a name compounded of three Greek words (καλὸς, εἶδος, and σκόπος), and denoting the exhibition of beautiful forms, is the designation of an optical instrument which was invented by Dr. (Sir David) Brewster, and made public in 1817.

The essential parts of the instrument consist of two plane mirrors of glass, having their posterior surfaces blackened in order to prevent any reflection of light from thence. Each mirror is from six to ten inches long, and of a trapezoidal form; the larger end about an inch and a half wide, and the shorter end about three quarters of an inch; and the two are placed in contact with one another at the wide end of each, so as to form a dihedral angle, the like ends being placed together. The object to be viewed is disposed contiguously to the larger ends, and the eye should be near the opposite extremity, but a little above the line of contact. The effects produced by the reflections of the light may be understood from the following explanations:—



Let A C, B C, be the two extremities of the mirrors on the side farthest from the eye of the observer. These lines, and the sectoral space between them, will be visible by rays coming directly to the eye; and, at the same time, rays from the line A C falling at a certain angle of incidence on the mirror which passes through B C will, on being reflected from thence to the eye, give rise to the image C *a* of that line; in like manner rays from the line B C falling at an equal angle of incidence on the mirror passing through A C will, after reflection, give rise to the image C *b* of the line. These, with the intermediate rays, produce the first reflected sectors B C *a* and A C *b*. Other rays from the sector A C *b* at the surface of the mirror A C will fall on the mirror B C; and, while a portion of them arrive at such angles of incidence as to be reflected to the eye and produce the perception of the sector *a* C *b*′, another portion of them will be reflected back to the mirror A C at such angles of incidence as to be reflected to the eye and cause the perception of the sector *a*′ C *b*″. In a similar manner the rays first reflected from B C *a* will, by subsequent reflections, give rise to the perceptions of the sectors *b* C *a*′, *b*′ C *a*″.

Thus it is easy to perceive that an object, as M, on A C, with its immediately reflected image M′, will give rise to the appearances of similar figures at *m m*′, *m*″ *m*‴; and an object, as N, on A B, with its immediately reflected image N′, will give rise to the appearances of similar figures at *n n*′, *n*″ *n*‴: also an object, as P, between A C and B C, will appear by reflection similarly situated in all the other sectors.

Sir David Brewster found means to obtain multiplied images of such objects as flowers, trees, and even persons or things in motion: and thus

the importance of the instrument was greatly increased. Some kaleidoscopes have been executed in such a manner that the two mirrors may be placed at any required angle with one another; by which means the images in the visible field of view may be varied at pleasure. The instrument is capable also of being constructed so that the multiplied image may be projected on a screen, and thus made visible at one time to many spectators. Again, Dr. Roget has shown ('Annals of Philosophy,' vol. ix.) that the properties of the instrument may be greatly extended by employing, instead of two, three and even four plain mirrors, united together at their edges so as to form a hollow prism, or a frustum of a pyramid, the reflecting surfaces being towards the interior. These are called polycentral Kaleidoscopes.

KALENDAR, a register or distribution of the year, accommodated to the uses of life, containing the order of days, weeks, months, festivals, &c., as they occur in the course of the year. It is so called from the *kalendæ*, or Kalends, which among the Romans denoted the first day of every month. The kalendar, being of civil institution, varies according to the different distributions of time in different countries. Those which we shall take more particular notice of are the Roman, the Julian, the Gregorian, and the Reformed Kalendar: a slight mention of the others will be sufficient.

Romulus, according to tradition, formed what is deemed the original Roman kalendar, by which the year was divided into ten months only, consisting of an unequal number of days, and began with March. The total number of days was 304. It was however soon discovered that the civil year, as thus constituted, was much shorter than the solar year. Romulus therefore added two intercalary months to every year; but these months were not inserted in the kalendar, nor were any names assigned to them until the following reign. Some Roman antiquaries maintained that the old kalendar continued in use till the time of Tarquinius Priscus.

Numa, in imitation of the Greeks, divided the year into twelve months, according to the course of the moon, consisting in all of 354 days: according to Pliny ('Hist. Nat.,' xxxiv. 7), he afterwards added one day more to make the number odd, which was thought a more fortunate number. But, as ten days, five hours, forty-nine minutes were wanting to make the lunar year correspond to the course of the sun, he intercalated every other year an extraordinary month, called *Mensis Intercalaris*, or *Mercedonicus*, between the 23rd and 24th of February. This month appears to have consisted alternately of 22 and 23 days during periods of 22 years, the last biennium in the 22 years being entirely passed over.

Julius Cæsar, when he had made himself master of the state, resolved to put an end to this disorder, by abolishing the use of the intercalations, and for that purpose, B.C. 47, adjusted the year according to the course of the sun, and assigned to the months the number of days which they still contain. He also added an intercalary day to February every four years. To make everything proceed regularly, from the 1st of the ensuing January, he inserted in the current year, besides the intercalary month of 23 days, which fell into it, two extraordinary months between November and December, the one of 33, the other of 34 days; so that this year, which was called the last year of *confusion*, consisted of fifteen months, or 445 days. These 67 days were inserted in order to set the year right, which was 67 days in advance of the true time.

All this was effected by the care and skill of Sosigenes, an astronomer of Alexandria, whom Cæsar had brought to Rome for that purpose; and a new kalendar was formed from his arrangement by Flavius, digested according to the order of the Roman festivals, and the old manner of computing the days by kalends, nones, and ides, which was published and authorised by the dictator's edict.

This is the *Julian* or Solar year, which continues in use to this day in all Christian countries, without any other variation than that of the *old* and *new style*, which was occasioned by a regulation of Pope Gregory XIII., A.D. 1582, who, observing that the vernal equinox, which at the time of the council of Nice, A.D. 325, had been on the 21st of March, then happened on the 10th, by the advice of astronomers caused ten days to be thrown out of the current year, between the 4th and 15th of October; and, to make the civil year for the future to agree with the real one, or with the annual revolution of the earth round the sun, or, as it was then expressed, with the annual motion of the sun in the ecliptic, which is completed in 365 days, 5 hours, 49 minutes, he ordained that every 100th year should not be leap-year, excepting the 400th.

This alteration of the style was immediately adopted in all Catholic countries; but not in Great Britain till the year 1752, when eleven days were dropped between the 2nd and 14th of September, so that this month contained only nineteen days; and thenceforth the new or reformed style was adopted, as it had been before in the other countries of Europe. The same year also another alteration was made in England, by which the legal year, which before had begun on the 25th of March, began upon the 1st of January; this alteration first took place on the 1st of January, 1752. (See the Statute 24 Geo. II. ch. 23.) By this statute the whole Gregorian kalendar was adopted.

Of the three parts into which the Romans divided their month, the *kalendæ*, or kalends, have been already explained. They were so called (*a calando* vel *vocando*), from the pontifex calling out to the people that it was new moon. The fifth day of the month was called *Nonæ*, the nones, and the 13th *Idus*, the ides, from the verb *iduare*, to divide; because the ides nearly divided the month. The nones, from *nonus*, the ninth, were so called because, counting inclusively, they were nine days from the ides. In March, May, July, and October, the nones fell on the 7th, and the ides on the 15th of the month. The mode of fixing any particular day was by saying that it was so many days before the kalends, nones, or

ides, next immediately following. Thus the 28th of April was the 4th day before the kalends of March; the 4th of March was the 4th day before the nones of March; and the 9th of March was the 7th day before the ides of March.

The Attic year consisted of twelve lunar months of 30 and 29 days alternately; an intercalary month of 29 or 30 days was inserted every two years; but, as this was 7½ days too much, the intercalary month was sometimes omitted. The full Attic month consisted of 30 days, and was divided into three decades.

KALENDAR, REVOLUTIONARY. A Report was made to the National Convention 6th October, 1793, on the new Kalendar by Fabre d'Eglantine; and a decree was passed on 4 Frimaire (24th November, 1793) for the establishment of the new Kalendar. The Committee of Public Instruction was commissioned to cause the new Kalendar to be printed in various forms, with plain instructions for its use. The instructions ('Instruction sur l'Ere de la République,' &c.) were drawn up by Romme. The Republican Kalendar is explained in a French work, in its sixth edition: 'Concordance des Calendriers Républicain et Grégorien,' par L. Rondonneau, Paris (6ème édition), 1812, 8vo.

The year was to begin at the midnight of Paris Observatory which precedes the true autumnal equinox. It was to consist of 365 days, with 12 months of 30 days each (the 30 days being 3 decades of 10 days each), and 5 complementary days, which were called *sansculotides* (a name afterwards repealed). A sixth complementary day was to be added, according to the words of the decree, 'selon que la position de l'équinoxe le comporte;' which adds, 'the period of four years, at the end of which this addition of a day is ordinarily necessary, is called the *Franciade*,' (Art. 10 of the Decree; and the remarks of Romme in the 'Instruction,' &c., § iii. 'De la Longueur de l'Année'). The first year of the French Republic began at midnight, the 22nd of September, 1792. The second year began on the 22nd, 1793, at midnight (Art. 5 & 6 of the Decree). The Gregorian reckoning was restored from and after January 1, 1806, by an imperial ordonnance, dated 22 Fructidor, An XIII. (September 9, 1805.)

Though every period of four years was a *Franciade*, and the last year of the Franciade was called *Sextile* (having six complementary days), yet in fact An IV., An VIII., &c., are not leap-years. The following list is actually made from the work above mentioned.

			Sept.	
	An I.	begins	22,	1792
	II.	„	22,	1793
Sext.	III.	„	22,	1794
	IV.	„	23,	1795
	V.	„	22,	1796
	VI.	„	22,	1797
Sext.	VII.	„	22,	1798
	VIII.	„	23,	1799
	IX.	„	23,	1800
	X.	„	23,	1801
Sext.	XI.		23,	1802
	XII.	„	24,	1803
	XIII.	„	23,	1804
	XIV.	„	23,	1805

When the Gregorian year is not leap-year, the beginnings of the months are as follows, according as the republican year begins on September 22, 23, or 24:—

1 Vendémiaire	is Sept.	22,	23,	24.
1 Brumaire	is Oct.	22,	23,	24.
1 Frimaire	is Nov.	21,	22,	23.
1 Nivose	is Dec.	21,	22,	23.
1 Pluviose	is Jan.	20,	21,	22.
1 Ventose	is Feb.	19,	20,	21.
1 Germinal	is March	21,	22,	23.
1 Floréal	is April	20,	21,	22.
1 Prairial	is May	20,	21,	22.
1 Messidor	is June	19,	20,	21.
1 Thermidor	is July	19,	20,	21.
1 Fructidor	is Aug.	18,	19,	20.

But, when the Gregorian year is leap-year, the beginnings of the months are as follows, according as the republican year begins on September 22, 23, or 24:—

1 Vendémiaire	is Sept.	22,	23,	24.
1 Brumaire	is Oct.	22,	23,	24.
1 Frimaire	is Nov.	21,	22,	23.
1 Nivose	is Dec.	21,	22,	23.
1 Pluviose	is Jan.	20,	21,	22.
1 Ventose	is Feb.	19,	20,	21.
1 Germinal	is March	20,	21,	22.
1 Floréal	is April	19,	20,	21.
1 Prairial	is May	19,	20,	21.
1 Messidor	is June	18,	19,	20.
1 Thermidor	is July	18,	19,	20.
1 Fructidor	is Aug.	17,	18,	19.

For instance, what is 14 Floréal, An XII.? The republican year begins Sept. 24, 1803, so Floréal falls in 1804, which is Gregorian leap-year. Look at the third Table; and, when the year begins Sept. 24, the first of Floréal is April 21: consequently the 14th is May 4, 1804.

KALENDÆ. [KALENDAR.]

KALGUJEW is a considerable island in the circle of Mesen, in the Russian government of Archangel, and situated to the north of the peninsula of Schemonkonski. It lies between 68° and 69° 40′ N. lat., and 47° 30′ and 48° 10′ E. long., and is about 66 miles in diameter. The surface is undulating; it has some low mountains, which rise in the centre, two small rivers, and several brooks of fresh water. The cliffs are covered with an incredible number of sea-birds; the interior is full of polar bears, foxes, &c. Except a few Samoides there are no settled inhabitants. At present it is only frequented by fishermen and seal-hunters from Mesen and Archangel.

KALI. [POTASH.]

KALISZ, Province. [POLAND.]

KALMIA, a genus of plants belonging to the natural order *Iricaceæ*. *K. latifolia* is a native of N. America from Canada to North Carolina, on the sides of stony hills. The leaves and flowers of this genus are poisonous, and the honey of bees which collect the juice is injurious. *K. angustifolia*, Haulm-Leaved Kalmia, is a native of North America from Canada to the Carolinas, in bogs and swamps, and sometimes in dry moun-

tain lands. It is a shrub one or eight feet in height, with dark red flowers. It is called Sheep-Laurel in North America, because it is supposed to be very injurious to sheep.

KALONG. [CHEIROPTERA.]

KALU'GA, a government of European Russia, lying between 53° 24′ and 55° 21′ N. lat., 33° 20′ and 37° E. long., is bounded W. and N.W. by Smolensk, N.E. by Moskva, E. by Tula, and S. by Orel. The area measures 12,134 square miles; the population in 1846 was 1,006,400. The surface is level, but here and there broken by a low hill or the wooded banks of the numerous rivers that flow through it. Forests cover about half the area, the arable lands about one-third. The soil for the most part is sandy clay. The Oka and its numerous feeders are the principal rivers. There are lakes and marshes in the centre and west of the government. The rivers, several of which are navigable for barges, or available for floating timber, are frozen from November to March. The soil of Kaluga being generally poor requires abundance of manure: the chief products are rye, oats, barley, wheat, hemp, and flax. Barely enough for the consumption is produced. Horses and horned cattle are scarce. Horticulture is carefully attended to. The mineral products are bog-iron, mill-stones, lime, gypsum, and turf. There are several great iron-forges. The manufactures of distilled spirits, coarse woollens, linen, sail-cloth, calico, silk, velvet, ribands, leather, paper, glass are important. *Kaluga*, the capital of the government, is situated in 54° 30′ N. lat., and 36° 5′ E. long., on the Oka, and has 32,345 inhabitants. It is surrounded with a rampart converted into a public walk. The streets are narrow, and for the most part consist of wooden houses. The best buildings are the bishop's palace, the residence of the governor, and the principal church. Hempseed, hemp, flax, linseed, honey, and wax are largely exported.

KAMPEN. [OVERYSSEL.]

KAMTCHATKA, a peninsula projecting from the north-eastern parts of Asia into the Pacific, in a direction nearly due south, lies between 51° and 63° N. lat., and between 155° and 165° E. long. Its length is above 800 miles, and its width varies between 30 and 120 miles. The interior of the peninsula is generally rugged. A mountain range running east of the river Kamtchatka is distinguished by several high summits, which are of volcanic origin, and most of them still active. One of these summits, the Kliootchewskaja, is 15,825 feet above the sea-level. The mountains approach close to the eastern coast, which is composed of high rocks, rugged cliffs, and bold promontories, forming numerous inlets, the entrances to which are blocked up by reefs of rocks. The western shore, along the Sea of Okhotzk, is more low and sandy. The best part of the peninsula is the vale of the Kamtchatka River, which towards its southern extremity is 40 miles across, but grows narrower as it proceeds northward. Its length is 180 miles. Its soil is deep and rich, composed of a black earth, and exhibits a considerable degree of fertility. The Kamtchatka River, about 300 miles long, is the only important one in the peninsula.

The climate of Kamtchatka, when compared with that of Europe under the same latitude, is very severe, but it is much milder than the eastern districts of Siberia. Rain is frequent in summer and in winter a great deal of snow falls. In a few spots rye, barley, buckwheat, potatoes, white cabbages, turnips, radishes, and cucumbers are grown, but these articles are only cultivated by the Russian settlers. The number of horses and cattle is on the increase. The natives formerly lived chiefly on the produce of the chase; but since the number of wild animals has considerably decreased fishing is more attended to. Fish is very abundant on the coasts. The forests contain many fine timber-trees, which are little used, but might be employed in ship-building. The mineral wealth is little known: in some places there is iron ore, and sulphur in immense beds is found in the vicinity of the volcanoes.

Two native tribes inhabit the peninsula, the Kamtchadales in the south and the Koriakes in the north. The Kamtchadales are short, but stout, and broad in the shoulders. Their head is large, their face flat and broad, their cheek-bones are prominent, their lips thin, and their nose flattened. Their hair is black, hard, and lank, their eyes sunk, in the head, and their legs thin. They evidently belong to the Mongol race. The Koriakes are principally distinguished from them by the smallness of their head. Both nations differ in language and in mode of life. The Kamtchadales are huntsmen and fishermen; while the Koriakes are a wandering tribe, subsisting on the produce of their numerous herds of rein-deer.

The principal towns are Pétropaulovski, Nishnei Kamtchatka, and Bolcheresk; but their population and commerce are very inconsiderable.

Kamtchatka is a Russian province annexed to the government of Eastern Siberia, or that of Irkutsk.

KANDAHAR, or CANDAHAR. [AFGHANISTAN.]

KANT, IMMANUEL, was born April 22 1724, at Königsberg in Prussia, where he lived all his life. He died there on the 12th of February, 1804. He received his early education at the gymnasium, whence he removed in 1748 to the university, to attend the classes of philosophy, mathematics, and theology. In 1755, he commenced a series of private lectures on logic and metaphysics, physics, and mathematics, which he continued to give for fifteen years, until he was invited, in 1770, to fill the chair of logic and metaphysics, which he held until 1794.

When Kant first entered upon philosophical studies, there was nothing but superficial eclecticism and uncompromising dogmatism on the one hand and on the other an unlimited doubt, which was cherished by the refined scepticism of Hume. To put an end to this state of things, which was as dangerous to morality and religion as it was subversive of the legitimacy of knowledge, was the object of Kant's philosophical labours; and for this purpose he sought to expel both dogmatism and scepticism from philosophy.

Kant accordingly proceeded to an examination of man's cognitive faculty, in order to di

cover the laws and extent of its operation. This investigation he designated the Criticism of the Pure Reason, and he maintained that the reason, as a pure faculty, must criticise not only itself, but also the subordinate faculties of sense and understanding. Kant understood by *pure* whatever is independent of experience, as opposed to the empirical, which rests upon it. The pure, or whatever in knowledge expresses the universal and necessary, is *à priori*, that is, antecedent to experience; whereas all that is contingent, or only comparatively general, is *à posteriori*. The first requisite in philosophy is a science which may establish a possibility, and determine the principles and extent of such knowledge. Now it cannot be derived from experience, which only shows an object to us such as it appears to be, without declaring that it must be such as it is. All attempts to derive the necessary from experience are unsuccessful, because they contradict the consciousness which recognises an essential difference between necessary and contingent. Experience serves only as a stimulus to awaken the faculties of pure cognition, so that afterwards, by reflection and abstraction, we become conscious of them. As, then, we are undoubtedly in possession of such pure or *à priori* knowledge, of which it is impossible to place the origin in experience, it must have its root in the pure reason itself, which cannot be the ground of the contingent and empirical; for the pure reason contains nothing except the formal or necessary principles of all knowledge, whereas the objects to which these principles refer are given to the mind from without. As an instance of these universal and necessary principles, Kant adduces the law of causation. The notion of a cause implies the necessity of its being connected with some effect, and enforces so strongly the universality of this law, that it is inconsistent with the derivation of it from the repeated association of an effect with antecedent. The next point which Kant notices, in the 'Introduction to Critic of the Pure Reason,' is the distinction between analytical and synthetical judgments. The analytical are those in which the predicate is connected with the subject by identity; the synthetical are devoid of all identity of the subject and predicate. Analytical judgments may be also termed explanatory, the synthetical may be called extending judgments; since in the analytical the predicate adds nothing to the notion of the subject, and only resolves the notion which forms the subject into its constituent and subordinate notions, which are contained in it, whereas in the synthetical a new element is added by the predicate to those already contained in the subject, which was not previously understood in it, and therefore would not result from it by any analysis. For instance, the proposition that all bodies are extended is analytical; but the assertion that all bodies are heavy is synthetical. All the conclusions of experience are synthetical. Experience proves the possibility of the synthesis of the predicate 'heavy' with the subject 'body;' for these two notions, although neither is contained in the other, are nevertheless parts of a whole, or of experience, which is itself a synthetical combination of its intuitions, although they only belong to each other contingently.

This contingent bond of union however is wholly wanting in synthetic judgments *à priori*. For instance, in the position, 'whatever happens has a cause,' the notion of a cause is not contained in the subject 'whatever happens,' and it indicates something very different from it. How then, and by what means, are we enabled to say of 'whatever happens' something absolutely different from it, and to recognise 'cause,' although not contained in it, as necessarily belonging to it? It cannot be experience, since in the above proposition the conception of a cause is attached to the subject, not merely generally, but universally, and necessarily. Now all speculative *à priori* knowledge ultimately rests upon such synthetic or extending judgments; for, though the analytical are highly important and requisite for science, still their importance is mainly derived from their being indispensable to a wide and legitimate synthesis, whereby alone a new acquisition in science can be made. The proper problem therefore of the pure reason is contained in the question—how are synthetic judgments *à priori* possible?

With a view to resolve this problem of the pure reason, Kant begins with an exposition of the transcendental elements of knowledge (*transcendental elementarlehre*). By transcendental he understood original or primary, or whatever is determined *à priori* in reference, not only to human cognition, but also to man's collective activity, and which consequently is the basis of the empirical, or that which is determined *à posteriori*. In short, all pure knowledge makes up the transcendental philosophy, and on it rest the authority and possibility of cognition. The *elementarlehre* is divided into the transcendental æsthetic and the transcendental logic. In the former Kant investigates the *à priori* elements of the lowest cognitive faculty — sensation; in the latter, those of the understanding and of the reason. In the æsthetic he shows that the sensuous faculty receives the matter of its intuitions and sensations from without by means of certain affections or excitements of the sense, whereas the forms according to or by means of which this matter is shaped into representations or conceptions of determinate objects are given originally and by itself. These forms are the pure intuitions of space and time, because in them nothing else is intuitively viewed than the unity of that which is multiple either in succession or in co-existence. On this account he calls time and space forms of intuition, and designates the objects which we so intuitively view by the name of phenomena. Of the ground of these phenomena, or, as Kant termed it, the thing in and by itself, it is left doubtful and undetermined whether it is anything actual or not, notwithstanding that Kant ascribes to phenomena themselves a certain objectivity or reality, on the ground that from their constancy and regularity they cannot be a mere semblance or illusion of the senses. On this account his theory has been called a transcendental idealism, as being in nowise inconsistent with that system of empirical

realism which by our conduct in life we practically maintain.

Transcendental logic is divided into analytic and dialectic, of which the former is the critic, or investigation of the understanding, as the faculty of notions; the latter, of the reason, as the faculty of ideas. But, for the further explanation of this part of his system, we refer to the article 'Kant,' in the 'Penny Cyclopædia.'

The criticism of the transcendental dialectic gives this result—that the ideas of the reason, as pure speculative ideas, are nothing more than simple conceptions, for which no corresponding object can be scientifically shown to exist. Accordingly neither the existence of God, nor the immortality of the soul, nor the freedom of the will, can be demonstratively established. Nevertheless the reason is not merely a theoretical, but also a practical faculty, which gives the law of human conduct and action. Now these laws present themselves with such unconditional necessity (the *categorical imperative*), that no rational man can refuse obedience to them; and, on the other hand, without the freedom of the will these laws could not be obeyed; and without God and the soul's immortality there would be no final cause or motive for human conduct, which must be placed in a state of felicity, agreeable to morality, provided by and to be obtained through God, in another and a better life. Consequently every man who is conscious of his moral destination holds these practical ideas to be both true and objectively legitimate, notwithstanding that he is compelled or required to admit them merely by a subjective ground—the testimony of his own consciousness, and of the moral wants resulting from its dictates. This Kant calls the postulate of the practical reason. The acceptance of this postulate as true and legitimate does not constitute a scientific certainty, or knowledge properly, which indeed does not exist for the supra-sensible; it is merely a belief. This faith or belief however is thus distinguished from every other, that it is a moral or practical faith, and consequently possesses for the believer all the certainty requisite for the guidance and conduct of life, and consequently it enjoys a subjective certainty and authority. This faith is the proper foundation of religion, which is nothing else than a conscientious observance of all duties as divine commands, since God, as the moral lawgiver, cannot be worthily honoured otherwise than by obedience to the laws of morality.

No complete edition of the works of Kant has yet appeared. The most important in a philosophical sense are the 'Kritik der reinen Vernunft,' 7 ausg., Leipzig, 1828; 'Kritik der praktischen Vernunft,' 6th edit., Leipz., 1827; and the 'Kritik der Urtheilskraft,' 3rd edit., Berl., 1827.

KANTEMIR, ANTIOCHUS DMITRIJVITCH, was born at Constantinople, Sept. 10, 1708. In 1722 he accompanied his father, who was hospodar of Moldavia, in the campaign against Persia, after which (1725) he prosecuted his studies in the Academy of Sciences at St. Petersburg. In 1731 he was despatched by the Empress Anne to the British court in quality of resident, but in the following year was promoted to be ambassador extraordinary and plenipotentiary, in which capacity he was sent in 1738 to the court of France. The Empress Elizabeth confirmed all the dignities that had been bestowed upon him by her predecessor. He died at Paris, March 1, 1774. Kantemir's aim as a writer was to inform and correct, as is sufficiently attested by his Satires. His other works were chiefly translations, viz. ten of the 'Epistles' of Horace, Fontenelle's 'Plurality of Worlds,' Epictetus, Cornelius Nepos, Montesquieu's 'Persian Letters,' &c.; but none except the first two have been published.

KANTURK. [Cork.]

KAOLIN, the Chinese name for *porcelain clay*. It occurs massive and disseminated in disintegrating granite rocks, and is generally supposed to be derived from the decomposition of the felspar which they contain. Its colour is either white, yellowish, or reddish-white. Fracture fine earthy; soft, dull, and opaque; adheres to the tongue; specific gravity 2.216; infusible. Kaolin is found in China, France, Saxony, &c.; and in England a large tract of this substance occurs near St. Austle in Cornwall, on the south side of the granite range. It contains crystals of felspar, quartz, and mica. From this source the porcelain manufactory of Worcester is supplied. Analysis: Silica, 46.8; alumina, 37.3; potash, 2.5; peroxide of iron, 0.4; water, 13.0.

KARAMSIN, NIKOLAI MIKHAELOVITCH, was born in the government of Simbirsk, December 1st, 1765. He entered the military service, and in 1789-91 visited Germany, Switzerland, Italy, France, and England, which tour he has described in his 'Letters of a Travelling Russian.' On his return to Moscow he devoted himself entirely to literature, one of his first undertakings being the 'Moscow Journal,' which was succeeded by 'Aglaia,' the 'Pantheon,' and the 'Væstnik Europæ, or European Intelligencer' (1802). The great work to which he entirely devoted himself, from 1803 to the very time of his death, is his 'History of the Russian Empire,' which however he did not live to complete beyond the eleventh volume. The first edition, comprising the first eight volumes (1816), produced him the sum of 100,000 rubles; and the title of councillor of state, and the order of St. Anne, were bestowed on him by the emperor Alexander.

After his death the twelfth volume, then nearly prepared in manuscript (bringing the history down to 1611), was edited by M. Bludov, minister of the interior. Since then the work has been continued. Karamsin died June 3, 1826.

KASAN. [Casan.]

KATER, HENRY, an English mathematician of some eminence, and an excellent practical philosopher, was born at Bristol, April 16th, 17[illegible], but of his early life very little is known. He obtained a commission in the army; and in 18[illegible] while holding the rank of lieutenant in the 1[illegible] regiment (infantry), he became a student in the senior department of the Royal Military College, Sandhurst. During his residence at that institution he was promoted to a company in the 6[illegible]

regiment; and, on quitting the college, he received a certificate of the first class. He was afterwards made brigade-major of the eastern district.

The determination of the precise length of the seconds' pendulum, an object of high importance in physical science, engaged the attention of Captain Kater during several years; and he was the first who availed himself of the convertibility of the points of suspension and oscillation for the determination of the exact length of a mathematical pendulum vibrating in the same time as a given pendulum. At the request of the Royal Society of London, he proceeded, in July 1818, to Dunnose, in the Isle of Wight, to Arbury Hill, Clifton, Leith Fort, Portsoy, and the island of Unst, where he made the necessary experiments; and he subsequently computed for those places the several lengths of the seconds' pendulum.

But the name of Captain Kater will be transmitted to posterity in connection chiefly with his invention of the floating collimator, an instrument which has conferred on practical science essential benefits, its object being the determination of the position of the line of collimation in the telescope attached to an astronomical circle.

Captain Kater was a Fellow of the Royal Society of London, and in 1814 he received from the Emperor of Russia the decoration of the Order of St. Anne. After a life spent in philosophical research, he died in London, April 26th, 1835, leaving behind him many proofs of his zeal for the promotion of physical science.

KATMANDU. [NEPAUL.]

KAUFMANN, ANGELICA, was born at Chur, in the Grisons, Oct. 30, 1741. Her father, a portrait-painter, devoted unusual attention to the education of his daughter, who displayed uncommon abilities at an early age, both for painting and for music. He took her, while still young, to Milan, where they dwelt some time; and in 1763 they visited Rome, and there Angelica attracted universal notice among the virtuosi, and obtained considerable reputation for her portraits in oil.

In 1765 Angelica visited Venice, and in the same year came, in company with Lady Wentworth, to England, where she was received in a most flattering manner: she was elected one of the original thirty-six members of the Royal Academy, founded in 1768. She returned to Italy in 1782, having in the previous year been married to Antonio Zucchi; she did not however change her name, but was always known as Angelica Kaufmann. She died at Rome in 1807, or, according to some accounts, in 1808. She etched several plates, and many of her own works have been engraved by Bartolozzi and other eminent engravers; but her success must be attributed to her general accomplishments, for as a painter she did nothing of value beyond an elegant female portrait, or an occasional female figure.

KEAN, EDMUND, was born about 1787, in London. His father, Edmund Kean, seems to have been a stage-carpenter, and his mother, Miss Ann Carey, was an actress at minor theatres and with strolling players, and in showman's booths. Little attention seems to have been paid to his instruction by any one, but his theatrical education commenced early. His mother took him with her in her rambles with strolling players and showmen. Master Carey, as he was then called, was so clever, that once, when Miss Carey was performing at Windsor, he was required to give his recitations before George III. at the Castle, which he did, to his Majesty's great delight, and was dismissed with a handsome present.

Kean's first performance of a complete character was that of young Norval, in 'Douglas,' in the booth of Richardson of Bartholomew Fair notoriety; his first engagement with a regular company was in 1804, when he made his appearance at Sheerness on Easter Monday, on which occasion he played George Barnwell and Harlequin in a pantomime. From this time till 1814, when he made his first appearance at Drury Lane Theatre, London, his life was a series of the vicissitudes, struggles, and privations, incident to the profession of an actor in country theatres. In November 1813, while acting at Dorchester, he was seen and appreciated by Mr. Arnold, manager of Drury Lane Theatre, who engaged him provisionally on behalf of the Committee of Drury Lane Theatre, for three years, at a salary of eight, nine, and ten pounds per week for each successive year. This occasioned a contest with Mr. Elliston, then manager of the Olympic Theatre, who alleged that he had made a previous engagement with him. A delay was caused by the claim, highly distressing to Kean, who was in extreme poverty, but at length Mr. Arnold ventured to complete his bargain, and the play-bills of Drury Lane announced 'The Merchant of Venice,' 'Shylock by Mr. Kean, from the Exeter Theatre.' There had been no previous puffing, and the house was thinly attended, but the applause was tumultuous: he repeated the character; the house was well filled, and his fame was thenceforth established. Mr. Whitbread, on the part of the Drury Lane Committee, cancelled the original agreement, and presented him with a sketch of a new engagement, by which he was to receive a weekly salary of 20*l.* per week. Not long afterwards the Committee made him a present of 500*l.*, and he received many valuable presents from individuals.

Kean's career of success, including a visit to America in 1820, was uninterrupted till January 1825, when the action of Cox *v.* Kean was tried, and a verdict of 800*l.* damages was pronounced against him for adultery with the alderman's wife. The public were exasperated against him; he was driven from the stage of Drury Lane, and afterwards from that of Edinburgh, and then availed himself of an invitation to pay a second visit to America.

After an absence of two seasons in the United States, Kean returned to London, having during the time not only acquired but saved a considerable sum. He had however now fallen into habits of almost constant intoxication; his constitution was broken up, his memory was impaired to such a degree that he could not study a new part, his alacrity of spirit was gone, and his performances were little more than a faint reflection of what they had been. Kean quarrelled with and dis-

carded his son Charles, whom he had sent to Eton College, for wishing to become an actor; but they afterwards became reconciled, and in 1833 it was announced that Kean would play Othello, at Covent Garden Theatre, with his son Charles as Iago. Kean struggled through the part as far as the speech 'Villain, be sure,' when his head sunk on his son's shoulder: he was borne off the stage, and his acting was at an end. He lingered for a while, but died May 15, 1833.

Kean in his person was small, but well formed; his face was thin, but handsome; his eyes and hair were black; his countenance, in variety and intensity of expression, was wonderful; his voice, in its upper tones, was somewhat harsh, in its lower tones it was soft and melodious; his action was free, graceful, varied, and appropriate; his conception of character was original and true, and evidently the result of observation and deep and careful study. He did not, as some have supposed, trust to the impulse of his feelings. He studied his characters much and anxiously. Frequently, after his family were retired to rest, he would act scene after scene before the pier-glass, endeavouring to produce, by expression of countenance, gesture, emphasis, and modulation of voice, the effect which his conception of the character required.

KEATS, JOHN, was born in Moorfields, London, in the year 1796. He received a classical education at Enfield, under Mr. Clarke, and was afterwards apprenticed to a surgeon. In 1817 he published a volume containing his juvenile poems, and shortly afterwards his long poem, 'Endymion,' which called forth a violent attack from the 'Quarterly Review.' Keats, whose health had been impaired by his attentions to a dying brother, went to Rome to recover his health, and there he died February 24th, 1821, having previously published a third volume of poems, containing 'Lamia,' 'Isabella,' 'The Eve of St. Agnes,' and 'Hyperion.'

The poetry of Keats is of an exceedingly rich and luxuriant character, and his writings so crowded with images, that it at last becomes almost fatiguing to apprehend them. In the sublime, Keats is not so happy as in the wildly beautiful. In the fragment 'Hyperion,' where we miss the exuberance, we also miss the brilliant fancies of the 'Endymion.' His poetry is adapted for those who are in thought and imagination poets themselves, rather than for the general reader.

Mr. Monckton Milnes has recently (1849) edited the 'Life and Letters of John Keats,' which gives a painfully interesting picture of the poet in his latter days, sinking under the effects of consumption and a hopeless attachment which had contributed to undermine his health.

KEIGHLEY. [Yorkshire.]

KEILL, JOHN, a distinguished British mathematician and natural philosopher, was born at Edinburgh in 1671, and, having received the rudiments of education in that city, he completed his course of study in its university. In 1694 he was entered at Balliol College, Oxford, where he distinguished himself by the lectures which he delivered in private on various subjects relating to natural philosophy, principally from the works of Newton. In 1700 he was elected a Fellow of the Royal Society of London, and in the same year he succeeded Dr. Millington as Sedleian professor of natural philosophy. Two years afterwards he published a work in Latin under the title of 'Introductio ad veram Physicam,' which was well received in this country.

In 1709 Keill went to New England with the appointment of treasurer to the Palatines, who were sent to America as emigrants at the expense of the British government: he returned, however, in the following year, and was immediately chosen Savilian Professor of Astronomy at Oxford.

In 1713 the University of Oxford conferred on him the degree of Doctor in Physic; and in the same year he published an edition of Commandine's 'Elements' of Euclid, with a tract on Trigonometry, and one on the Nature of Logarithms. In 1718 he published a work entitled 'Introductio ad veram Astronomiam,' which he afterwards translated into English; and there are several papers by Keill in the 'Philosophical Transactions' for 1708, 1713, 1714. He died Sept. 1, 1721.

KEITH. [Banffshire.]

KELP. [Ashes; Sodium.]

KELSO. [Roxburghshire.]

KEM. [Archangel, Province.]

KEMBLE, JOHN PHILIP, was born Feb. 1, 1757, at Prescot, in Lancashire. His father, Mr. Roger Kemble, was manager of a provincial company performing in Staffordshire, Warwickshire, Gloucestershire, &c. He was educated partly at the Roman Catholic seminary of Sedgeley Park, in Staffordshire, and afterwards at the English college at Douay, in France, whence at the age of nineteen he returned to England, and made his appearance in the character of Theodosius in the tragedy of that name, at Wolverhampton, January 8th, 1776. Two years afterwards he was a regular member of the York company. On Tuesday, 30th of September, 1783, Mr. Kemble made his first appearance in London at Drury Lane, in Hamlet. In 1790 he became manager of that theatre. In 1803 he purchased for 24,000*l.* a sixth share in Covent-garden Theatre from Mr. Lewis, and became manager of that establishment. In 1808 Covent-garden was destroyed by fire; and on the opening of the new theatre in 1809, under Mr. Kemble's management, an advance in the prices of admission to the pit and boxes gave rise to the well-known O. P. riots, during which the tragedian was personally and grossly insulted whenever he appeared upon the stage. On June 23, 1817, he took his leave of the London audience. Mr. Kemble soon afterwards retired to the south of France, and finally took up his residence at Lausanne, in Switzerland, where he died Feb. 26, 1823, aged 66. Mr. Kemble's talents, both as an actor and a manager, were of a very high order: his fine taste and classical acquirements were perceptible in every effort. In society Mr. Kemble was ever the accomplished gentleman as well as the convivial companion, and to the last enjoyed the respect and regard of the noblest and wisest in the land. Mr. Kemble

life has been written by his friend Mr. Boaden, in 2 vols. 8vo.

KEMPIS, THOMAS A. born about 1380, at Kempen, near Cologne, was a regular canon of the monastery of Mount St. Agnes, where he applied himself to transcribing the Bible and other religious books. He afterwards began a collection of pious and ascetic treatises, among which were the four books 'De Imitatione Christi,' which have been erroneously ascribed to him as his own composition, but which he merely transcribed. The authorship of the work is generally attributed to John Gerson, chancellor of the University of Paris, who died in 1429. Thomas à Kempis composed some ascetic treatises, such as 'Dialogus Novitiorum de Contemptu Mundi,' &c., but they are inferior to the book 'De Imitatione J. C.' He died in 1471.

KEMPTEN (the ancient *Campodúnum*), a town on the Iller, in the Bavarian circle of Upper Danube, is built in the old-fashioned style, and consists of two parts—the *Stifts-stadt*, or St.-Hildegard, which stands on a hill; and the ancient free imperial city, which is in the valley. It has a castle, two churches, a gymnasium, a hospital, and an orphan asylum. There are manufactures of cotton and linen, and considerable trade in furs, wool, salt, linen, &c. The population is about 7000.

KENDAL. [WESTMORLAND.]

KENILWORTH. [WARWICKSHIRE.]

KENNEBECK. [MAINE.]

KENNET, River. [BERKSHIRE.]

KENNETT, WHITE, born 1660, died 1728, was educated at Westminster and Oxford, and, after filling various other offices in the church, became bishop of Peterborough in 1718. He wrote and published much. His MS. collections are in the British Museum. His printed works include sermons, controversial pamphlets, and topographical and ecclesiastical antiquities.

KENNICOTT, BENJAMIN, was born of humble parents, at Totness in Devonshire, April 4th, 1718. In 1744 some friends raised a sum of money to enable him to go to Oxford. He entered at Wadham College, and applied himself with the greatest diligence to the study of divinity and Hebrew. He was elected a Fellow of Exeter College shortly afterwards, and took his degree of M.A. in 1750. He continued to reside at Oxford till the time of his death, Sept. 18, 1783. He was a canon of Christ Church, and librarian of the Radcliffe Library, to which office he was appointed in 1767.

The most celebrated of Kennicott's works is his edition of the 'Hebrew Bible,' which was published at Oxford in 2 vols. fol., the first volume in 1776, and the second in 1780. In 1753 Dr. Kennicott published a work 'On the State of the Printed Hebrew Text of the Old Testament,' which was succeeded by another volume on the same subject in 1759. An important Supplement to Kennicott's Hebrew Bible was published by De Rossi, under the title of 'Variæ Lectiones Veteris Testamenti,' Parma, 1784-88, 4 vols. 4to.; to which an appendix was added in 1798. An elegant edition of the 'Hebrew Bible,' which also contains the most important of Kennicott's and De Rossi's various readings, was published by Jahn, Vienna, 1806, 4 vols. 8vo., which may be recommended as the best critical edition of the 'Hebrew Bible.'

KENT, a maritime county of England, is bounded N. by the æstuary of the river Thames, E. by the German Ocean and the Straits of Dover, S. by Sussex, and W. by Surrey. A detached portion of the parish of Woolwich in Kent lies on the north side of the Thames. The greatest length of the county from E. to W. is about 64 miles; the greatest breadth, N. to S., is about 40 miles. The area is 1557 square miles. The population in 1841 was 548,337.

Coast-line, Islands, &c.—The northern part of the county, along the æstuary of the Thames, is skirted by a line of marshes, which are very extensive near the junction of the Thames and the Medway, forming a portion of the Isle of Grain. Eastward of this island is the Isle of Sheppey, extending about 10 miles by 5, the surface of which is laid down for the most part in grass, but the upland part on the northern side produces good corn. The marshes terminate east of the Swale, and the coast again rises to some height in clayey cliffs, which extend nearly to the Isle of Thanet. In this isle, which occupies the north-eastern corner of the county, and which is separated from the rest of the county by the Stour, the chalk cliffs commence, and continue along the whole line of coast to Pegwell Bay, which is the boundary of the isle to the south-east. The North Foreland is on the coast of the Isle of Thanet, due east of Margate. The chalk cliffs of the Isle of Thanet are succeeded by the low coast of Pegwell Bay, which continues to Walmer Castle near Deal, Here the chalk cliffs recommence, and continue round the South Foreland to Sandgate, presenting many lofty heights near Dover. From Sandgate the coast begins to get lower until it forms the extensive tract of Romney Marsh, which ends at the border of Sussex, near Rye. Opposite Deal lie the Goodwin Sands, the channel between which and the Kentish coast is the well-known roadstead of the Downs. The Goodwin Sands are about 10 or 11 miles long from N. to S.; the greatest breadth is 3 or 4 miles. The sands are divided into two parts by a narrow channel called the 'Swatch,' navigable by small boats.

The Downs, which are about 8 miles in length and 6 in width, are a safe anchorage, and are the general rendezvous of shipping leaving the Thames for the Channel, or returning homeward. To the north of the Downs are 'The Small Downs,' a smaller roadstead immediately contiguous to the Downs properly so called.

Surface and Geology.—Kent is on the whole a hilly county. The chalk range of the North Downs enters the county on the west side from Surrey, and runs nearly east through the county, being cut by the valleys of the Darent, the Medway, and the Stour. Many of the chalk hills rise from 400 to 650 feet in height.

The district between the chalk range and the æstuary of the Thames is, for the most part, occupied by the plastic clay, which immediately

overlies the chalk, and is again overlaid by the London clay in the Isles of Grain and Sheppey, in the shore near Reculver, and in other parts of the county, including Shooter's Hill.

South of the North Downs the chalk marl and greensand crop out, and cover a belt of land which skirts the chalk throughout the whole extent of the county from west to east. South of this belt is another occupied by the Weald clay, about five miles in width; and this is bounded on the south by a belt of iron-sand. The Weald of Kent was anciently an immense forest, inhabited only by deer and hogs. The greater part of it has however been gradually cleared and brought into cultivation.

Hydrography and Communications.—The northern boundary of the county is formed by the Thames, to the basin of which nearly the whole county belongs. The other principal rivers are the Ravensbourn, the Darent, and the Medway, which flow into the Thames; and the Stour and the Rother, which flow into the sea. The lengths of the rivers are about as follows:—Ravensbourn, 10 miles; Darent, 20; Cray, 9; Medway, 60; Eden, 16; Teise, 17; Beult, 20; Stour, 45. The Medway is by far the most important of these; it rises near East Grinstead, and flows past Penshurst, Tunbridge, Yalding, Maidstone, Rochester, and Chatham, to the Thames at Sheerness. The tide flows up to Maidstone Bridge. Ships and large vessels cannot ascend above Rochester Bridge. Below Rochester the æstuary gradually expands to a considerable width, and forms an important harbour for the British navy. Numerous arms of the river or creeks penetrate the marshes, which spread inland to a considerable extent from the banks of the river. The Stour, which has two main branches, distinguished as the Greater and the Lesser Stour, insulates the Isle of Thanet. The channel continued to be navigable for ships of tolerable burden in the reign of King Henry VIII.; but subsequently, the waters of the northern branch having been distributed by means of floodgates over the land, this arm from the Stour to Reculver became too small for navigation. The Greater Stour is navigable from Fordwich to Sandwich.

The principal canal in Kent is the Royal Military Canal, which was formed rather for the purposes of defence than of commerce, during the alarm of invasion in the war against Napoleon. It has however since been converted to commercial use. It runs from Oxney to Hythe. The Thames and Medway Canal runs from Gravesend to Rochester: its tunnel of two miles, now laid dry, forms a portion of the North Kent Railway.

Kent has a most abundant steam traffic from Dover, Deal, Ramsgate, Margate, Herne Bay, Sheerness, Gravesend, Greenhithe, Erith, Woolwich, Charlton, and Greenwich, to London; from Rochester to Sheerness; from Ramsgate and Dover to Ostend; from Dover to Calais and Boulogne; and from Folkestone to Boulogne.

The whole of the railways of the county belong to one company—the South-Eastern. They comprise lines from Edenbridge to Ashford; Ashford to Rye; Ashford to Dover; Ashford to Canterbury; Canterbury to Ramsgate and Margate; Canterbury to Whitstable; Minster to Deal; Paddock Wood to Maidstone; Tunbridge to Tunbridge Wells; the Greenwich and Bricklayers' Arms' Branches; and the North Kent (London to the Medway), to be opened in 1849.

Climate and Agriculture.—The climate of Kent is in general mild and genial. The soil may be divided into the gravel, chalk, and clay, which produce, where they mix in due proportions, an extremely fertile loam. The alluvial soils along the Thames and Medway, and in Romney Marsh, produce some of the richest marsh pastures in the kingdom.

Throughout the whole county the clay may be said to predominate, and the mode of cultivation generally adopted is that which suits the strongest soils.

Besides the usual crops which are raised on good clays, Kent produces several which are peculiar to it, such as canary and radish seed, which grow chiefly in the Isle of Thanet, where there are few hedge-rows to harbour birds, which are very destructive to these crops. Other seeds are likewise raised for the London seedsmen, such as spinach, cresses, and white mustard. Kidney beans are cultivated to a considerable amount in the neighbourhood of Sandwich, and produce from ten to twenty bushels per acre. Woad and madder were formerly more commonly cultivated in Kent than they are now; the foreign, being raised at a less expense, has driven the Kentish out of the market.

There is comparatively a very small proportion of grass land in Kent, if we except the sheep downs on the chalk hills and the marshes. The marshes produce most of the hay consumed in winter. Romney Marsh, which is well known for the richness of its grass, contains about 44,000 acres; on the borders of the Stour are 27,000; and along the Medway, Thames, and Swale, about 11,500 more. A great many sheep are reared and fattened in these marshes. The cattle fed there are only a secondary consideration, sheep being found more profitable.

There are very few dairies of any consequence in Kent, nor is any cheese made, except for domestic consumption.

Hops are grown to a very great extent in this county, and, with the exception of those which are raised at Farnham in Surrey, are the most esteemed of any in England.

In that part of Kent which is nearest to London there are many extensive gardens; and about Deptford hundreds of acres are laid out in asparagus beds. Great quantities of peas are also raised for the London market on the line of road from London to Rochester. Apples, pears, plums, and cherries are raised in orchards, and the produce sent to London markets. The cultivation of filberts is peculiar to Kent, and well managed, especially in the neighbourhood of Maidstone.

There are still some extensive woods in Kent, but they are diminishing every year; and the produce of bark and timber is much reduced from what it formerly was. The demand for hop-poles

has caused more attention to be paid to underwood; and some of the coppices, which are well managed, give a sufficient return to prevent their being grubbed up and converted into arable land.

Divisions, Towns, &c.—Kent is divided into five lathes. Each lathe comprehends several hundreds, and other smaller divisions. The lathes are—*Sutton-at-Hone Lathe, Aylesford Lathe, Scray Lathe, St. Augustine Lathe,* and *Shepway Lathe.*

There are several parts of the county which have their particular 'liberties,' exempt from the jurisdiction of the county magistrates. They are as follows:—1. The county of the city of Canterbury. 2. The city of Rochester. 3. The borough of Maidstone. 4. The liberty of Romney Marsh, which is under the jurisdiction of its own bailiff and jurats. 5. The liberty of the cinque-ports, which is partly in Kent and partly in Sussex. [CINQUE-PORTS.] Kent is in the diocese of Canterbury, except the city and deanery of Rochester, and some parishes which are in the diocese of London. It is in the Home Circuit, except certain parishes near London, which, in criminal matters, are within the jurisdiction of the Central Criminal Court. The assizes are held at Maidstone. For parliamentary purposes the county is divided into East Kent and West Kent, each of which returns 2 members to parliament; besides which, the cities of Canterbury and Rochester, the cinque-ports of Dover and Sandwich, and the boroughs of Greenwich and Maidstone, return each 2 members; and the cinque-port of Hythe and borough of Chatham return each 1 member: total, 18 members.

The following are the principal towns, with the population of each in 1841:—

Ashford, a market-town, is situated on the west bank of the Stour, 14½ miles S.S.W. from Canterbury. There is a market-house in the centre of the town. The church has a central tower, erected in the reign of Edward IV., when the church itself was repaired, if not rebuilt. Population of the parish, 3082.

Aylesford, a village, is situated on the east bank of the Medway, 3½ miles N.W. from Maidstone. There is an ancient church with a square tower at the west end. Population of the parish, 1344. Close to the Medway, a short distance west from Aylesford, was a Carmelite friary, which was suppressed at the Reformation. Many portions of the conventual buildings yet remain in the present mansion of the Earl of Aylesford. On the side of the hill, about 1½ mile E.N.E. from Aylesford, is Kit's Coty House, one of those druidical monuments called cromlechs. [CROMLECH.] Two stones placed upright, each 8 feet above the ground, 8 feet long, and 2 feet thick, form the sides; another upright stone, 5 feet high, 5 feet broad, and 14 inches thick, closes one end, the other end being left open; a fourth stone, 11 feet long, 8 feet broad, and 2 feet thick, forms a flat cover like a roof, sloping towards the closed end. All the stones are very rude and irregular.

Broadstairs, a village on the coast, near the North Foreland, is resorted to as a bathing-place. There are several good houses, and also libraries, warm-baths, and other accommodations. Population, 1459.

Bromley, a market-town, is situated near the east bank of the Ravensbourn, 6 miles S. by E. from Greenwich. It is a small but neat town, with a market-house near the centre, supported on wooden pillars. The church has a low tower at the west end, massy and embattled. The entrance to Bromley church-yard affords a specimen of the ancient *lich-gate,* by which the corpse was borne into the burying-ground. Population of the parish, 4325.

Canterbury. [CANTERBURY.]

Chatham, a market-town and parliamentary borough, is situated on the north bank of the æstuary of the Medway, a short distance east from the city of Rochester, with which it is connected by a continuous line of houses. Chatham is 30 miles E. by S. from London. It was an insignificant place till after the commencement, about 1757, of the great naval and military establishments, which are at Brompton, a little E. of Chatham, and entirely separated from it by a line of fortifications. These establishments consist of a dockyard nearly a mile in length, which has four wet-docks capable of receiving vessels of the largest class; an extensive arsenal; barracks on a large scale for artillery and engineers, infantry, and marines; a park of artillery; large magazines and store-houses; besides a handsome dock-chapel, and habitations for the civilians who are employed. There is a school for engineers, established in 1812, and near the dockyard gate is a large naval hospital. There is also at Chatham an establishment of hulks for convicts. Population of the town, 21,431. Population of the parliamentary borough, which returns one member, 17,903.

Cranbrooke, a market-town, 48 miles S.E. from London, is irregularly built. The church is a handsome structure in the perpendicular style, with buttresses and fine windows. Population of the parish, 3995.

Dartford, a market-town, 15 miles E. by S. from London Bridge, is situated in a narrow valley, on the river Darent, about 3 miles from its junction with the Thames. Barges ply on the river between the Thames and the wharf below the town. There are several mills in the neighbourhood, corn-mills, paper-mills, and especially powder-mills, driven by the river. Population of the parish, 5619.

Deal, a market-town and municipal borough, is situated on the coast, 18 miles E.S.E. from Canterbury. It is annexed to Sandwich as a member of the cinque ports. The town of Lower Deal extends a considerable way along the shore; Upper Deal, the most ancient part, is further inland. There is a good pier, but no harbour. The fine roadstead called the Downs extends in front of Deal between the shore and the Goodwin Sands; and the Deal fishermen, as well as the pilots, whose services are in almost constant requisition, have the highest reputation for skill and intrepidity. At the south end of the town is Deal Castle, erected by Henry VIII., in a good

state of repair; and a little more than a mile farther south is Walmer Castle, the residence of the Lord Warden of the Cinque Ports, with a modern house, and handsome grounds and garden. The borough of Deal is divided into 2 wards, and is governed by 6 aldermen and 18 councillors. Population of the parish, 6688.

Dover (sometimes written *Dovor*), a municipal borough, parliamentary borough, and Cinque-Port, 72 miles E.S.E. from London, and 15 miles S.E. from Canterbury, is situated on the coast, in a narrow valley between two high ranges of chalk hills, which are broken through, and form lofty precipices in front of the sea on each side of the town, and on the south side rise perpendicularly above the houses and close behind them. On the south side, about a mile distant, is the Shakspere Cliff, 400 feet high; and on the north side, near to the town, is Dover Castle, with its irregular lines of fortification on the brow of the cliff, and its numerous galleries excavated far below in the chalk rock. The Castle-Cliff is 325 feet above the sea, but the heights are much loftier. The town extends some distance up the valley, and stretches out on each side as far round as the cliffs will allow. The Dour, a small but clear stream, flows through the valley and falls into the harbour. The old town is irregularly built, and without any pretension to architectural effect, either in the streets or public buildings. The tower of St. Mary's church is of early Norman architecture, and another old church has also some Norman features. There is another church, which is modern. The market-house is a very ancient wooden structure. There is a theatre; and, as Dover is resorted to as a bathing-place, there are, on the north side of the town, crescents, parades, and terraces. The harbour consists of an outer harbour and an inner harbour, and both are empty at low water. But Dover is to be made a harbour of refuge, and a new harbour is about to be constructed, which will include 500 or 600 acres of the bay, and admit vessels of the largest size, with any wind and at all times of the tide. Dover is the chief packet-station for the opposite ports of France, and the prosperity of the place depends in a great measure on the intercourse between England and the continent. The South-Eastern Railway extends by Folkestone under the Shakspere Cliff to Dover. The municipal borough is divided into 3 wards, and is governed by 6 aldermen and 18 councillors. Population of the town and port, 13,872. The parliamentary borough returns 2 members: population, 17,795.

Eltham, formerly a market-town, 7 miles E.S.E. from London Bridge, is a small place, which deserves notice on account of the remains of a royal palace there, built at a very early period, in which Henry III. held Christmas in 1270. Succeeding kings frequently resided in it till the time of Henry VII., when Greenwich Palace was built, and that of Eltham was suffered to fall into decay. The hall, now occupied as a barn, is 100 feet long by 56 feet wide, with a carved timber roof, and windows which have been very elegant, but are now mostly bricked up. The area of the palace is surrounded by a wall, and the ditch, which is now dry and planted with shrubs, is crossed by an ancient bridge.

Faversham, a market town, is situated on a stream which runs into the East Swale, just to the left of the road to Dover, 47 miles E.S.E. from London Bridge. It was a place of some note before the time of King Stephen, who built and endowed here an abbey for Cluniac monks, in which himself, his queen Matilda, and his eldest son Eustace of Boulogne, were buried. The town consists principally of four streets forming an irregular cross, and having the guild-hall and market-place in the centre. The church is a large cruciform structure of flint. The town contains also a theatre, assembly-rooms, union-workhouse, and gaol. The council of the borough of Faversham, under the Municipal Reform Act, consists of 4 aldermen and 12 councillors. The creek or arm of the Swale, on which the town stands, is navigable for vessels of 150 tons. The parish of Faversham is in the cinque-port liberty of Dover. Population of the parish, 4621.

Folkestone, a market-town and sea-port, is situated on the shore of the English Channel, partly in a hollow between two cliffs, and partly on the west cliff. The streets are narrow and steep. The harbour, owing to the accumulation of shingle, is not capable of affording anchorage to many vessels, but has been considerably improved by the engineers of the South-Eastern Railway Company, who purchased it when they extended the line of railway from Folkestone to Dover. Steam-packets ply between Folkestone and the opposite ports of France. The council under the Municipal Reform Act consists of 4 aldermen and 12 councillors. Folkestone, on memorial from the corporation to the Lords of the Treasury, Dec. 1847, was detached from the cinque-port of Dover, and constituted an independent port of the 6th class, and legalised for the importation of silk goods from Calais and Boulogne. Folkestone was by the Reform Act made part of the parliamentary borough of Hythe. Population of the town of Folkestone, 3723. The village of Sandgate, which is partly in Folkestone parish, is a place of some resort as a bathing-place. There is a castle at Sandgate, built by Henry VIII.

Gravesend, a market-town and municipal borough, is situated on the south bank of the Thames, 22 miles from London Bridge, through Dartford. Gravesend has of late years become a great place of resort for visitors from the metropolis, and has been much enlarged and improved; the old town is however still mean and irregular. Two piers have been erected for landing passengers, and a convenient bathing-house for visitors. There are a library, concert-room, and theatre. The municipal borough is divided into 2 wards, and is governed by 6 aldermen and 18 councillors. Population of the parish, 6414, but this is exclusive of the parish of Milton (9256), in which part of the town is situated.

Greenwich, a market-town and parliamentary borough, is situated on the south bank of the Thames, 5 miles E.S.E. from London. The town is partially paved and lighted with gas, but most of the streets are narrow. The park, which con-

prises nearly 200 acres, is diversified with lawns, and well planted with elms and chestnut trees. Upon an eminence is situated the Royal Observatory, commonly called Flamsteed House; and it is from the meridian of this observatory that the longitudes are computed in all British maps. The south gate of the park opens upon Blackheath, where Wat Tyler and Jack Cade both encamped, and which has been the scene of other memorable assemblages. About a mile to the west of Greenwich is the royal dockyard of Deptford, established by Henry VIII., which comprises a space of about 31 acres, in which the ships of the royal navy were formerly built and repaired. Greenwich communicates, through Deptford, with the metropolis by a railway on arches of brick, which commences near London Bridge. The chief object of interest in Greenwich is the hospital for aged, wounded, or disabled seamen. It is built on the site of a manor-house built by Humphrey, duke of Gloucester, which Henry VII. converted into a palace, and which became a favourite residence of Henry VIII. and other succeeding kings and queens, till it was pulled down by Charles II., who projected the present building. The architect selected for this new work was Webb, son-in-law of Inigo Jones, under whose superintendence the present north-western wing was built, and became the occasional residence of Charles II. No further progress towards completion was made till the reign of William III., whose wife, it is said, having suggested the plan of founding an asylum for disabled seamen belonging to the royal navy, it was determined that the unfinished palace of Greenwich should be enlarged and adapted to that purpose. Sir Christopher Wren undertook to superintend the work without any emolument. The foundation was laid June 3, 1696, and the hospital was opened for the reception of pensioners in 1705. Large sums have since been bequeathed by benevolent individuals for the use of the hospital, and the buildings have been successively enlarged and improved. The whole now consists of four quadrangular piles, built principally of Portland stone. The chapel was erected from a design of James Stuart, and is highly ornamented. The hall, a noble room opposite to the chapel, was painted by Sir James Thornhill, and contains a fine collection of paintings, consisting of naval portraits and sea-fights. The management of the establishment is in the hands of a governor, lieutenant-governor, two chaplains, and numerous other officers. The pensioners, of whom there are generally between 2000 and 3000, receive their maintenance, clothing, and lodging, besides a weekly allowance for pocket money. Population of the town, 29,755. The parliamentary borough, which returns 2 members, includes Deptford and Woolwich, and contains a population of 72,748.

Herne Bay, on the north coast, about 10 miles W. from Margate, has recently been a good deal resorted to as a watering-place. A pier has been erected, and also a church and assembly-rooms. The population, which in 1841 was 1572, has since been increasing.

Hythe, a municipal borough, parliamentary borough, and one of the cinque-ports, 15 miles S. from Canterbury, is situated at the foot of a steep hill or cliff, about half a mile from the shore, and consists chiefly of one long street, parallel to the sea, with some smaller ones branching from it, or parallel to it. The town-hall and market-place are in the centre of the town. The church, on the slope of the hill, above the town, is very ancient. There is a small theatre. The corporation of Hythe, under the Municipal Reform Act, consists of 4 aldermen and 12 councillors. Hythe formerly returned 2 members to parliament; by the Reform Act it sends only 1. The parliamentary borough includes the municipal borough, the liberty of the town of Folkestone, and the parishes of West Hythe, Saltwood, Cheriton, and Folkestone, and part of that of Newington. These limits include the watering-place of Sandgate. Population of the cinque port, parish, and municipal borough, 2265. Population of the parliamentary borough, 8939.

Lee and *Lewisham* are two villages a short distance south from Greenwich. Lewisham consists of a street of good houses, extending about 2 miles along the road from London to Hastings. Population of the parish of Lee, 2360; of Lewisham, 9361, exclusive of the chapelry of Sydenham (which is 2950).

Lydd is a member of the cinque-port of New Romney, from which it is distant about 2 miles S., and is about 3 miles N.W. from Dungeness Point. Population of the parish, 1509.

Maidstone, a municipal borough, parliamentary borough, and the assize-town of the county, is situated on a declivity on the west bank of the Medway, 8 miles S. from Rochester, and 34 miles E.S.E. from London. The town consists of four principal streets, well paved, and containing many good houses. A lock has been made at Allington, about a mile below Maidstone, to improve the navigation of the river, previous to the formation of which the tide ascended to Maidstone. There is much traffic on the river, in coals, timber, iron, groceries, &c., upwards, and in Kentish ragstone, paper, hops, fruit, &c., downwards. The chief public buildings are—the town-hall, the county gaol, the corn-exchange, the ancient parish church, which is very large, and a modern church. The municipal borough is divided into 3 wards, and is governed by 6 aldermen and 18 councillors: population, 18,086. The parliamentary borough returns 2 members: population, 16,920.

Margate, a sea-port town in the Isle of Thanet, on the north coast of the county, about 3 miles from the North Foreland, and 65 miles E. by S. from London, direct distance. Margate has been of late years a favourite sea-bathing place. A stone pier has been erected, 900 feet long, which has very greatly improved the harbour, previously much exposed to winds from the N.E. The modern streets and public structures, including the church, an esplanade, squares, &c., are well built and lighted with gas. Population of the parish, 11,050, which included 1586 visitors and 245 persons in the Royal Bathing Infirmary at Westbrook, near Margate. Margate is a member of the cinque-port of Dover.

Milton is a market-town, situated on a creek of the Swale, 39½ miles from London. The town is on the side of a hill sloping down to the creek, and is ill-built. The business of the place arises from its oyster fishery, and from its being the port of communication with London for the surrounding agricultural district. In the centre of the town is the ancient court-house for holding the manor courts, with the town gaol beneath. Much corn is shipped here. The church is chiefly in the decorated English style, and is large and handsome.

Queenborough is in the Isle of Sheppey, 45½ miles from London. Queenborough belonged to the Saxon kings, who had a castle here, on the site of which Edward III. commenced a new and more extensive fortress. Edward made the town a free borough, and gave it the name of Queenborough, in honour of his consort Philippa. This castle was demolished in the time of the Commonwealth. Queenborough is now a poor place, and the greater part of the inhabitants are dependent on the oyster fishery. Queenborough was disfranchised by the Reform Act, before which it returned 2 members to parliament. Population of the parish, 634.

Ramsgate, a sea-port town in the Isle of Thanet, on the east coast, about 4 miles S. from the North Foreland, is a favourite sea-bathing place. An excellent harbour has been constructed, which has contributed greatly to the prosperity of the town. The east pier is 2000 feet in length, the west pier about 1000 feet; they are constructed of Purbeck stone and granite. The old part of the town is built in a hollow between two chalk ridges, on which the modern part of the town is built. There are terraces, crescents, bathing-rooms, assembly-rooms, a handsome modern church, and several places of worship for dissenters. Ramsgate is a member of the cinque-port of Sandwich. Population of the parish, 10,909.

Rochester is a city, and the see of a bishop. [ROCHESTER.]

Romney is called *New Romney*, to distinguish it from *Old Romney*, which is a little farther inland, and had been deserted by the sea before the time of Edward the Confessor, when the harbour of New Romney was formed. New Romney is situated on the east coast, about 4 miles N. from Dungeness. New Romney is one of the cinque-ports. The town stands in Romney Marsh, in an exceedingly fertile tract, which is used as pasture-land, chiefly for sheep, and which is defended from the encroachment of the sea by a high and broad embankment called Dymchurch Wall, which extends northwards about 4 miles to the village of Dymchurch. The town consists chiefly of one wide well-paved street, with a market-house and a hall, or brotherhood-house, in which the mayor, jurats, and commons of the cinque-ports frequently hold their sittings. There is a weekly market. The church is a very ancient and handsome building. Population of the cinque-port and parish, 955.

Sandwich, a municipal borough, parliamentary borough, and cinque-port, is situated 12 miles E. from Canterbury, near the east coast, and on the south side of the Stour, at its entrance into Pegwell Bay. It is a very ancient town, and had once a fine harbour, but the sand had begun to fill it up before the reign of Elizabeth, and in the reign of Edward VI. it was almost entirely destroyed. Only vessels of small draught can now get up to Sandwich. The streets are narrow, ill-paved, and dirty; the houses rude, mean, and low. There are two ancient churches, both of which have been injured by tasteless modern alterations, by plaster and whitewash. The municipal borough is governed by 4 aldermen and 12 councillors. Population of the town and port, 2913. Population of the parliamentary borough, which includes the parish of Deal, and returns 2 members, 11,194.

Sevenoaks, a market-town, is pleasantly situated on the northern slope of the North Downs, near the upper course of the Darent, 24 miles S.E. from London. The town is well built, and contains many good houses. The church is of perpendicular architecture, spacious, and elegant; and there is a well-endowed grammar-school. The surrounding district is very fertile. Population of the parish, 2462.

Sheerness is situated on the north-western point of the Isle of Sheppey, on the eastern side of the æstuary of the Medway, at its junction with the Thames, 49 miles E. from London by the road through Rochester. The town consists of three parts—Sheerness, including the fortress and dock-yards; Blue-Town, which is inclosed by an outer line of fortifications; and Mile-Town, which is an outer uninclosed suburb. The fortress occupies the extreme point of the island, and the principal batteries front the Thames. The dockyard is surrounded by a brick wall, and is sufficiently capacious to receive ships of war of the largest size. There are large storehouses, a mast-house, rigging-house, sail-loft, &c., with residences for the port-admiral, commissioner, and other officers. Population of the parish of Minster-in-Sheppey, which includes the village of Minster, as well as Sheerness and its suburbs, 8684.

Sittingbourne is 40 miles E. by S. from London, on the road to Canterbury and Dover. It consists chiefly of one main street, has some good inns, and depends in a great measure on travellers who pass between London and Dover. There is also communication with London by barges from a quay on Milton creek. Population of the parish 2352.

Tenterden, a market-town and municipal borough, is 55 miles S.E. from London. It consists chiefly of one main street along the Romney road and contains some good houses. The church is of perpendicular architecture, with a lofty tower at the west end. The municipal borough is governed by 4 aldermen and 12 councillors. Tenterden is included in the cinque-port liberty of Hastings in Sussex. Population of the parish, 3620.

Tunbridge, or *Tonbridge*, a market-town, is on the north bank of the Medway, 30 miles S.E. from London. The town consists chiefly of one street, broad, partially paved, and, from its being on a declivity, clean. There are several bridges over the Medway, which is here divided in

various arms. Near the principal bridge is a wharf, and the Medway is made navigable to Maidstone by means of locks. The church is a large and handsome fabric, in various styles of architecture. There is a free-school richly endowed, a town-hall, and market-house. The ruins of the castle and the ruins of a priory partly remain. The South-Eastern Railway passes by Tunbridge, and there is a branch from Tunbridge to Tunbridge Wells. Population of the town, 5260.

Tunbridge Wells is 5 miles S. from Tunbridge, on the border of Kent and Sussex, part of it being in each county. The chalybeate spring, to which the town owes its origin, is nearly equal in strength to that of Spa, in Germany. When Henrietta, queen of Charles I., visited the Wells, she and her suite remained under tents. After the Restoration the place rapidly increased. A chapel was built, and an assembly-room, coffee-house, bowling-greens, and other places of amusement were erected in the neighbourhood. The Wells, properly so called, are in the centre of the town, and near them are the markets, the assembly-rooms, and the public walks. There is a handsome modern church and a theatre, and there are libraries, and the other usual requisites of a watering-place. Population of the town, 8302.

Westerham is 21 miles S.S.E. from London, near the source of the Darent. It is a market-town. Population of the parish, 2162, chiefly agricultural.

Whitstable is about 6 miles E. from Canterbury, with which city it communicates by a railroad. It is the port of Canterbury. Hoys convey goods to and from London, and colliers discharge their cargoes here. The inhabitants are engaged in the oyster fishery. Population of the parish, 2255.

Woolwich, a market-town, is on the south bank of the Thames, 8 miles E. from London. The town consists chiefly of a street, nearly a mile long, on the bank of the river, with other streets diverging from it. The importance of Woolwich has arisen from its dockyard, from the government foundry for cannon having been established there, and from its having been made a great depôt for naval and military stores. The Royal Dockyard contains two large dry docks, a basin 400 feet by 300 feet, capable of receiving the largest vessels, together with extensive storehouses, mast-houses, &c. The foundry for cannon forms one of the principal departments of the Royal Arsenal; another department is the Pattern-Room, which contains a model of every article used in the artillery service. The storehouses of the Royal Artillery are to the north of the Royal Arsenal. The Royal Artillery barracks are on the north side of Woolwich Common. The Royal Military Academy is at the south-east edge of Woolwich Common. The Rotunda, on the west side of Woolwich Common, is a depository for models connected with military and naval architecture. In the Rope yard, at the east end of the town, cables of the largest size are made. There are also at Woolwich the Royal Marine barracks, the barracks of the Royal Sappers and Miners, and the Royal Ordnance Hospital. The entire population, in 1841, was 25,785, which included all the naval and military establishments.

History and Antiquities.—The name of this county is supposed to be Celtic. No portion of England played a more important part than Kent in the Roman times; it was the scene of Cæsar's first attack; and in most of the subsequent invasions it was, from its proximity to the continent, in the path of the invaders. There were Roman stations at Reculver, Richborough, Dover, and Hythe; and roads from Canterbury to these places and to London by the road called Watling Street. Richborough Castle, near Sandwich, is the *Rutupæ* of the Romans. The walls form a parallelogram, but the east wall has disappeared, and probably fallen into the Stour. The area within the walls is five acres. The walls are flanked by projecting round towers at the angles, and by intermediate round towers. The walls are built of blocks of chalk and stone, and faced on both sides with squared blocks of Portland or grit-stone, banded at intervals with double rows of large flat tiles. The walls to the height of six feet are eleven feet three inches thick; above that height they are ten feet eight inches. The top of the wall is everywhere imperfect; its greatest height is twenty-three feet. A quarter of a mile from the south-west angle of the castle are the remains of a Roman circular amphitheatre of about seventy yards' diameter. Many portions of the Roman Watling Street coincide with the present high road from London to Canterbury.

In the Saxon invasion Cantium was the scene of many interesting events. The brothers Hengist and Horsa landed in Pegwell Bay, probably about A.D. 446 or 449. Having received a grant of the Isle of Thanet, then insulated by a channel of some width, they received accessions of strength from their countrymen at home, and were soon involved in hostilities with the Britons. Many irruptions of the Jutes followed, and many battles between them and the Britons. In A.D. 752, Kent was subject to Mercia. In 823, after the successes of Egbert, Kent became a subordinate part of the West Saxon empire. It commonly formed the appanage of the eldest son, or heir apparent, of the King of Wessex, and when the heir succeeded to the paramount sovereignty he usually resigned the Kentish crown to his heir. During the reign of Ethelwulf in Wessex, and of his sons in Kent, the latter kingdom was repeatedly attacked by the Danes, and down to the time of the Norman Conquest Kent was seldom free, for any considerable period, from the hostile incursions of the Danes.

At the great battle of Hastings the men of Kent formed the vanguard of the Anglo-Saxon army. At the outbreak of the war of the Roses, A.D. 1451, Richard, duke of York, encamped near Dartford, where he fortified himself. The king, Henry VI., encamped on Blackheath. In the civil war of Charles I. and the Parliament, a severe battle was fought at Maidstone, A.D. 1648, in which the Parliamentarians, under Fairfax, obtained a complete victory. In 1667, a detachment from the Dutch fleet under De Ruyter sailed up the Medway as far as Upnor Castle.

Of ancient castellated edifices, besides the Roman and Saxon remains, the most remarkable are the castles of Leeds, Hever, Chilham, Allington, and Westerhanger, to which may be added the castellated mansions of Penshurst and Knowle. Leeds Castle is surrounded by a broad moat: the entrance is by a stone bridge of two pointed arches, and through a deep gateway in good preservation. Another gateway, which defended the entrance of the bridge, is in ruins. Part of the building has been modernised: the foundations of the more ancient part, which formed the keep, rise immediately from the water, and are very strong. Hever Castle is surrounded by a moat: the entrance gateway is flanked by round towers; the inner buildings form a quadrangle inclosing a court. Chilham Castle was a Norman structure, of which the keep is the only part that now remains. Of Westerhanger the principal remains are the outer walls, with the towers of the north and east sides. Penshurst Castle is one of those castellated dwellings that immediately succeeded the baronial castles of a more troubled period. The principal buildings form a quadrangle inclosing a spacious court, and comprehending a hall, chapel, and other apartments. Knowle is another extensive and magnificent mansion: the principal buildings form a spacious quadrangle, and are in the castellated style. The greater part is of the fifteenth century, but some portions of it are yet older. Knowle Park is very beautiful.

Of monastic remains, the principal are St. Augustine's Abbey, at Canterbury, Aylesford Priory, St. Radigund's Abbey, near Dover, the abbeys of Faversham and Malling, the priories of Tunbridge and Folkestone, and Boxley Abbey, near Maidstone. Besides the cathedrals at Canterbury and Rochester, the most interesting ancient church, perhaps, is that of Barfreston, between Canterbury and Dover.

KENT, WILLIAM, was born in Yorkshire, in 1684. Both his parentage and education were humble, and he was apprenticed to a coach-painter. He attempted to establish himself as an artist; and in 1716, while in Italy, he became acquainted with the Earl of Burlington, who became his patron, and under whose roof he resided till his death, April 12, 1748. Kent soon discovered greater capacity for architecture than for painting and sculpture; and, if it be true that the designs for Holkham, the seat of the Earl of Leicester, in Norfolk, emanated principally, if not entirely, from him, that single edifice alone proves him to have possessed superior talent. In landscape-gardening he formed an epoch, and may justly be considered as the father of the English style.

KENT, JAMES, was born at Winchester, in 1700, and while young was admitted as one of the children of the Chapel Royal, London. He was afterwards organist of Trinity College, Cambridge, whence he removed in 1737, to fill the same situation in the cathedral of his native place. He died in 1776.

Mr. Kent was very serviceable to Dr. Boyce, while the latter was preparing his magnificent work, the 'Collection of Cathedral Music.' In 1773 he published his 'Twelve Anthems,' among which are, 'Hear my Prayer,' 'When the Son of Man,' 'My Song shall be of Mercy,' and others familiar to the congregations of our cathedrals.

KENTUCKY, one of the United States of North America, is situated between 36° 30′ and 39° 10′ N. lat., and between 81° 50′ and 89° 20′ W. long. It is bounded N. by Ohio, Indiana, and Illinois, from which it is separated by the river Ohio; E. by Virginia; S. by Tennessee; and W. by the Mississippi, which separates it from Missouri. Its greatest length is about 400 miles, and its greatest breadth about 170 miles. The area is 40,500 square miles. The population in 1840 was 779,828, of whom 182,258 were slaves.

The south-eastern and eastern parts of Kentucky are covered with ridges of mountains and high hills. None of the summits of these mountains appear to attain the height of 3000 feet above the sea. The highest range is that of the Cumberland Mountains, in the S.E. To the west of the hilly region lies an upland region, which extends to about 86° W. long. The surface is undulating, but it is intersected by numerous river-beds, which are from 100 to 300 feet below the surface of the plain. The soil is of the first quality. The most western portion of the state is divided between the Barrens and a country which is partially hilly. The Barrens are in the S.W., between Green River and Cumberland River. In their natural state they are generally destitute of trees, and resemble the prairies or savannas which occur north of the Ohio. Though this tract does not deserve the name which it bears, it is of inferior fertility when compared with the upland region.

Along the northern boundary runs the Ohio, which receives all the larger rivers that drain Kentucky. The most eastern is the Big Sandy River, which separates Kentucky from a part of Virginia. It flows in a northern direction, and has a course of about 250 miles. The branches of the river Kentucky rise in the eastern part of the state, and form by their union a considerable stream, which first flows N.W., then W., and at last nearly due N. Its course is about 28[illegible] miles, and, though very rapid, it may be navigated by small boats for 180 miles from its mouth, when full, but at other times not higher up than Frankfort. Green River rises in the western district of the upland region, and flows W., N.W., and N. to the Ohio. Its course is 280 miles. Cumberland River rises in the eastern part of Kentucky and flows W. and S. into Tennessee, where it makes a large bend, then re-enters Kentucky, and flows N.W. to the Ohio. It is above 500 miles long. Licking River and Salt River are also of considerable size. The river Tennessee flows only about 70 miles through Kentucky.

The mean annual temperature of Kentucky seems to be about 55°, and consequently 5° higher than that of London, but the differences in the extremes of heat and cold are much greater. Wheat, tobacco, and hemp are the staple products, but Indian corn, rye, oats, barley, buckwheat, flax, and potatoes are also cultivated. Horses, cattle, and bacon are largely exported. Iron-o[illegible]

coals, salt, and lime are obtained. The greater part of the products of the state pass down the Ohio and Mississippi to New Orleans.

As a great part of the country is covered with forests, wild animals are still numerous, as deer, bears, wolves, foxes, hares, beavers, and otters.

The forests contain many timber-trees. Those of the mountains and upland region consist of elm, oak, hickory, black-walnut, cherry, &c.; those of the Barrens are chiefly oak, chestnut, and elm.

Kentucky is divided into 90 counties. *Frankfort*, the capital of the state, is situated on the east bank of the Kentucky, 60 miles above its junction with the Ohio, in 38° 14′ N. lat., 84° 40′ W. long. Steamboats of 300 tons' burthen come up to Frankfort when the water is high. The population in 1840 was 1917. *Lexington* is situated on a branch of the Elkhorn River, 24 miles E.S.E. from Frankfort. It is the oldest town in the States, and was formerly the capital. It is a well-built town, and contained, in 1840, 10 places of public worship, a State Lunatic Asylum, the halls of the Transylvania University, and 6997 inhabitants. *Louisville* is the most populous town of the state. It is situated on the south bank of the Ohio, in 38° 8′ N. lat., 85° 26′ W. long., about 50 miles W. by N. from Frankfort. It has increased with extraordinary rapidity. In 1800 the population was 600; in 1845 it was estimated at 30,000. The Ohio is more than a mile wide opposite the town, and there is a very large traffic on it by steam-boats and river-craft. *Maysville*, on the south bank of the Ohio, 81 miles N.E. from Frankfort, contained in 1840 a population of 2741.

Bardstown, or *Bairdstown*, 40 miles S.W. from Frankfort, contains a court-house, gaol, market-house, and 1492 inhabitants. St. Joseph's College (Roman Catholic), in the vicinity, had, in 1848, 17 instructors, 150 alumni, and 126 students.

The first Europeans arrived in Kentucky in 1767, and the first settlement was formed in 1775. It was originally a part of Virginia, but, the population having increased rapidly, Virginia consented to a separation. The first constitution was formed in 1790, and its present constitution in 1799. The legislative body consists of 38 senators, who are elected for four years, and 100 representatives, who are elected for one year. It sends 2 senators and 10 representatives to congress.

KENYON, LLOYD, LORD, the second son of Lloyd Kenyon, was born at Greddington in Flintshire, on the 5th of October, 1732. His education was, owing to the straightened means of his father, very defective. At the age of fourteen he was articled to Mr. Tomlinson, an attorney at Nantwich in Cheshire, with whom he remained for seven years, during which time his diligence and shrewdness procured him his master's favour. In 1754 he took chambers in the Temple, London, and became a member of Lincoln's Inn. While a student, he devoted himself with great earnestness to the law. Mr. Kenyon was called to the bar in Hilary Term, 1761, but many years elapsed before he obtained business. His legal attainments appear to have been not only considerable, but exact, and he acquired by degrees the reputation of being a sound lawyer. In 1773 he married Mary, third daughter of George Kenyon of Peele in Lancashire. He now began to rise into notice. In 1779 he was retained as one of the counsel for Lord Pigot in the state-prosecution of Shelton and others for depriving him of his government; and afterwards in the same year as leading counsel for Lord George Gordon. In April 1782, on the accession of the Fox and Rockingham, administration, he was appointed attorney-general. On the death of the Marquis of Rockingham he retained his office with Pitt as chancellor of the exchequer, and went out with the Shelburne administration in the spring of the year following. In December he was re-appointed attorney-general. To the character of an orator he had no pretension, being a man of little imagination, and expressing himself not only without elegance, but occasionally with vulgarity. He was no scholar, and yet he would insert Latin words and phrases without point or taste in his discourse.

In 1784 he was raised to the office of master of the rolls, and created a baronet; and in May 1788 he was gazetted Lord Kenyon, Baron Greddington, and succeeded Lord Mansfield as chief-justice of the King's Bench. His appointment to this important situation was at the time unpopular with the profession generally. To the opinion of his brother judges he gave a reception not only of neglect, but almost of contempt; and to the barristers he was equally ungracious.

Lord Kenyon struck sternly at those offenders who are the peculiar objects of popular dislike. But while doing so he frequently gave too easy credit to accusation, and allowed himself to punish often with a severity not sufficiently tempered. The vices of the wealthy met with no favour from him. In actions for criminal conversation, he directed juries (over whom no judge had greater power) to give damages of very large amount, and this even in cases where the collusion of the parties or the vicious conduct of the husband ought to have made nominal damages more than sufficient. Gamblers met with similar treatment from him: he made no distinction between the gamblers of St. James's and the pickpockets of the Strand. Lord Kenyon exerted himself to the utmost to put an end to duelling, and he declared that whoever was convicted of having murdered his fellow-creature in a duel should suffer the course of the law; and he on more than one occasion directed the jury to that conclusion, but without success. Flagitious libels against individuals were punished by him with merited severity. But, of all writings, those partaking of the character of political libels were those against which he directed, with the most unflinching perseverance, all the terrors of the law.

Lord Mansfield, when chief-justice, had somewhat unsettled the bounds of the courts of law; but Lord Kenyon reverted to the ancient strictness, and he expressed his determination to maintain it. He also always refused to allow the plain words of a statute to be refined away, however severe in its enactments, by any subtle sophistry.

At Nisi Prius he never brought a book with him

into court to refer to. The extent as well as the arrangement of his legal knowledge needed no such assistance. In performing the laborious duties of his profession he was diligent and exact. He died in 1802, after having accumulated a fortune of 300,000*l*. Lord Kenyon was temperate, frugal even to parsimony, and an early riser. For his happiness he looked to his home. He entirely disregarded outward appearance: his dress was shabby, his equipage mean, and he entirely neglected the exercise of hospitality.

(*Law Magazine*, No. 37, p. 49.)

KEPLER, JOHANN, was born near Weil, in the duchy of Würtemberg, Dec. 21, 1571. He was a seven months' child, very weak and sickly, and survived with difficulty a severe attack of small-pox. His parents were of noble descent, though their circumstances were far from affluent. The father, at the time of his marriage, was an officer in the service of the Duke of Würtemberg, and joined the army in the Netherlands a few years after the birth of his eldest son Johann. On his return to Germany, he learnt that an acquaintance for whom he had incautiously become security had absconded, and had left him the unexpected charge of liquidating the bond. This circumstance obliged him to dispose of his house and nearly the whole of his possessions, and to become a tavern-keeper at Elmendingen. Young Kepler had been sent in the year 1577 to a school at Elmendingen, and he continued there until the occurrence of the event to which we have just alluded, and which was the cause of a temporary interruption in his education, as it appears that he was taken home and employed in menial services until his twelfth year, when he returned to school. In 1586 he was admitted into the monastic school of Maulbronn, where the cost of his education was defrayed by the Duke of Würtemberg. The regulations of this school required that after remaining a year in the superior classes the students should offer themselves for examination at the college of Tübingen for the degree of bachelor. On obtaining this degree, they returned with the title of veterans, and, having completed the prescribed course of study, they were admitted as resident students at Tübingen, whence they proceeded in about a year to the degree of Master.

While thus engaged at Tübingen, the astronomical lectureship of Grätz, the chief town in Styria, became vacant by the death of George Stadt, and the situation was offered to Kepler, who was forced to accept it by the authority of his tutors, although we have his own assurance that at that period he had given no particular attention to astronomy. This must have been in the year 1593 4. In 1596 he published his 'Mysterium Cosmographicum,' wherein he details the many ingenious hypotheses which he had successively formed, examined, and rejected, concerning the number, distance, and periodic times of the planets, and finally proposes a theory which he imagines will account in a satisfactory manner for the order of the heavenly bodies, which theory rests upon the fancied analogy between the relative dimensions of the orbits of those bodies, and the diameters of circles inscribed and circumscribed about the five regular solids. In 1597 Kepler married a lady who, though two years younger than himself, was a widow for the second time. This alliance soon involved him in difficulties, which together with the troubled state of the province of Styria, arising out of the two great religious parties into which the empire was then divided, induced him to withdraw from Grätz into Hungary, whence he transmitted to a friend at Tübingen several short treatises—'On the Magnet,' 'On the Cause of the Obliquity of the Ecliptic,' and 'On the Divine Wisdom as shown in the Creation.' In 1600 Kepler, having learned that Tycho Brahé was at Benach in Bohemia, and that his observations had led him to a more accurate determination of the eccentricities of the planets' orbits, determined on paying him a visit, and was welcomed in the kindest manner by Tycho, by whom he was introduced the following year to the emperor, and honoured with the title of imperial mathematician, on condition of assisting Tycho in his calculations. Upon the death of Tycho, Oct. 1601, Kepler succeeded him as principal mathematician to the emperor. To this great man Kepler was under many obligations, not merely for the pecuniary assistance and hospitality which himself and family so often experienced from Tycho, and upon which at one period they entirely depended for subsistence, but still more for the sound advice which he gave him, to abandon speculation, and to apply himself to the deduction of causes from their observed effects,—advice which Kepler greatly needed, and to which, if he had adhered more closely, his fame would have been even greater than what it now is. It is to be regretted that upon several occasions the conduct of Kepler towards Tycho Brahé ill accorded with the generosity of the latter, though this appears to be attributable rather to the impetuosity of Kepler's temper than to any want of gratitude towards his benefactor. It has been said that Kepler was appointed imperial mathematician on condition of assisting Tycho in his calculations. The object of these calculations was the formation of new astronomical tables generally, which were to be called the Rudolphine Tables, in honour of Rudolph, the then emperor of Bohemia, who had promised, not merely to defray the expense of their construction, but likewise to provide Kepler with a liberal salary; neither of which his circumstances ever permitted him to fulfil. The part more particularly allotted to Kepler was the reduction of Tycho's observations relative to the planet Mars, and to this circumstance is mainly owing his grand discovery of the law of elliptic orbits, and that of the equable description of areas. The pecuniary difficulties however in which he found himself almost incessantly involved, in consequence of the non-payment of his salary, greatly retarded the progress of his labours, and obliged him to seek a livelihood by casting nativities. The Rudolphine Tables were therefore postponed, and he applied himself to works of a less costly character, from which he might expect to derive more immediate remuneration. In 1602 appeared his 'Fundamental Principles of Astrology;' in 1604 his 'Supplement to

Vitellion;' in 1605 'A Letter concerning the Solar Eclipse;' and in 1606 'An Account of the New Star which had appeared in 1604 in the Constellation Cassiopeia.' Of these the 'Supplement to Vitellion' was important, as containing the first consistent theory of that branch of optics termed dioptrics.

At length, in 1609, appeared his 'New Astronomy,' containing his great and extraordinary book 'On the Motion of Mars,' a work which holds the intermediate place and is the connecting link between the discoveries of Copernicus and those of Newton. The introduction is occupied in refuting the then commonly received theory of gravity, and in declaring what were his own opinions upon the same subject. In the course of this discussion he states distinctly that, since the attractive virtue of the moon extends as far as the earth, as is evident from its enticing up the waters of the earth, with greater reason it follows that the attractive virtue of the earth extends as far as the moon, and much farther; and he likewise asserts that, if two bodies of like nature be placed in any part of the world near each other, but beyond the influence of any other body, they would approach each other like two magnets, each passing over a space reciprocally in proportion to its mass. The theory adopted by Kepler, in the early part of his discussion of Tycho's observations, appears to have been that the orbit of each planet, including the earth, was circular; that it was described with a uniform angular velocity about a point within, called the centre of the equant, and that the centre of the orbit lay in the line joining the centre of the equant and the place of the sun, but not equidistant between those points, as had been previously supposed. With respect to the earth however, in particular, he had started with the erroneous opinion, then generally entertained by all astronomers, that the centre of the earth's equant coincided with that of its orbit, and that consequently not only its angular but also its linear motion was uniform, although its distance from the sun was known to vary. After four years of laborious calculation, the non-accordance of his results with observation obliged him to fix upon the bisection of the line joining the centre of the equant and the place of the sun, for the centre of the planet's orbit; and shortly after he was led to the conclusion that one of the two other principles upon which his theory rested must be erroneous; that either the orbit of the planet was not a perfect circle, or that there was no point within it round which it moved with a uniform velocity.

Having easily proved that at the apsides,—that is, the two points of the planet's orbit which are nearest to and farthest from the sun,—the times of describing equal small arcs are nearly proportional to the distances of the planet from the sun, he concluded with his accustomed precipitancy that the same relation existed at all other points of the orbit. An almost immediate consequence of this assumption was, that the time of describing an arc of any length whatever would be proportional to the sum of all the lines which could be drawn from the sun to every point of that arc; but, as the calculation of these distances was found to be excessively operose, he substituted the approximate area of the figure bounded by the arc and the two extreme distances for the sum of all the distances, and was thus led from erroneous principles to that beautiful law of the planetary motions by which the area described by the revolving radius vector is proportional to the time of its description. When however he came to apply this theory to the motion of Mars, the eccentricity of whose orbit is much greater than that of the earth's, he found that the circular hypothesis gave results differing from the observations of Tycho by at least eight minutes; and, as he considered that difference too great to be attributed to the error of so exact an observer, he concluded that the suspicions, which, as was above stated, he had long previously entertained, relative to the form of the planets' orbits, were well founded, at least with respect to the planet Mars. At length he deduced, from observations of that planet near the quadratures, that its orbit was an oval elongated in the direction of its apsides, and was thus led to the law of elliptic motions.

The elliptic form of the orbits and the equable description of areas constitute two of the three celebrated truths known by the name of Kepler's Laws. The third, viz. that the squares of the periodic times are proportional to the cubes of the mean distances from the sun, was not discovered till twelve years after, though, before the publication of his 'Mysterium Cosmographicum,' he had been speculating, as we have seen, upon finding some relation between those distances and periodic times. The final discovery resulted far less from philosophical deduction than from the innumerable combinations which his ever-active fancy had been calling into existence during the previous seventeen years; and indeed, when he at length detected the relation which he had so long been in search of, he was only able to offer an explanation of it upon four suppositions, three of which are known to be false.

In 1620 Kepler was visited by Sir Henry Wotton, the English ambassador at Venice, who, finding him, as he was always to be found, oppressed with pecuniary difficulties, urged him to go over to England, where he assured him of a welcome and honourable reception; but Kepler could never determine on quitting the Continent. In 1624 he went to Vienna, where with difficulty he obtained 6000 florins towards completing the 'Rudolphine Tables,' together with recommendatory letters to the states of Suabia, from whom he also collected some money due to the emperor. It was not however till 1627 that these tables—the first that were calculated on the supposition that the planets move in elliptic orbits—made their appearance; and it will be sufficient to say of them, in this place, that had Kepler done nothing in the course of his whole life but construct these, he would have well earned the title of a most useful and indefatigable calculator. In 1630 he made a final attempt to obtain a liquidation of his claims upon the imperial treasury; but the fatigue and vexation of his fruitless journey brought on a fever which terminated his life, in the early part of

November 1630, and in his 59th year. His body was interred in St. Peter's churchyard at Ratisbon, and a simple inscription, which has long since disappeared, was placed on his tombstone. Upon the character of Kepler, upon his failures, and on his success, Delambre has pronounced the following judgment:—'Ardent, restless, burning to distinguish himself by his discoveries, he attempted everything; and, having once obtained a glimpse, no labour was too hard for him in following or verifying it. All his attempts had not the same success, and, in fact, that was impossible. Those which have failed seem to us only fanciful; those which have been more fortunate appear sublime. When in search of that which really existed, he has sometimes found it; when he devoted himself to the pursuit of a chimera, he could not but fail; but even there he unfolded the same qualities, and that obstinate perseverance that must triumph over all difficulties but those which are insurmountable.'

KERMAN. [PERSIA.]

KERMANSHAW. [PERSIA.]

KERMES MINERAL, a peculiar sulphuret of antimony, formerly much but now little used in medicine. It is obtained in the form of a brownish red powder.

KERODON, a genus of rodent Quadrupeds peculiar to South America, remarkable for the form of the molars, which all resemble each other, and are composed of two equal parts, each of a triangular or rather heart-form shape, united on the external side of the tooth, and separated on its internal side. These triangles or 'hearts' are each surrounded by their enamel, and filled with bony matter, and their separation produces an angular notch partly filled with cortical substance.

When M. F. Cuvier wrote, only one species, *Kerodon Moco*, was known, and this was discovered by Prince Maximilian of Neuwied, and noticed by him under the name of *Cavia rupestris*. The fur is ash-gray mixed with reddish yellow, and blackish above and whitish below. Size smaller than that of the guinea-pig. This species was found in the rocky places of the interior of Brazil, near Rio San Francisco.

In 1835, Mr. Bennett exhibited to a meeting of the Zoological Society of London, a rodent, sent home among the animals collected by Captain Phillip Parker King, R.N., during his survey of the Straits of Magalhaens, and presented by him to the Society, which Mr. Bennett regarded as a second species of *Kerodon*, and for which he proposed the name of *Kerodon Kingii*. This species was found at Port Desire, on the eastern coast of Patagonia.

KERRY, a maritime county of the province of Munster, in Ireland, is bounded E. by Limerick and Cork, S. by Cork and the æstuary of the Kenmare, W. by the Atlantic Ocean, and N. by the æstuary of the Shannon. It lies between 51° 41′ and 52° 33′ N. lat., and between 9° 7′ and 10° 30′ W. long. The greatest length N. to S. is 54 miles; the greatest length E. to W. is 58 miles. The area is 1853 square miles. The population in 1841 was 293,880.

Kerry forms the south-western extremity of Ireland. The coast, which is bordered by the Atlantic, is deeply indented by the æstuary of the Kenmare River, the Bay of Dingle, and the Bay of Tralee. The peninsulas intercepted between these arms of the sea are occupied by the western extremities of that mountain system, which, commencing in Waterford, extends with little interruption across the entire south of Ireland. Beyond the range of mountains which crosses the centre of the county extends a rich and generally level country, which rises into rough land in only one direction, towards Kerry Head on the Shannon. The peninsula between the Kenmare æstuary and Dingle Bay is cut by minor ranges of mountains into three principal valleys. It contains the rivers Roughty, Fartagh, Inny, Sneem, Little Blackwater, and others of smaller size. The mountain-knot called Macgillicuddy's Reeks, which extends about 10 miles in a direction S.W. to N.E., subsiding into the plain at the head of Dingle Bay, contains Gurran Tual, 3410 feet above the sea-level, and the highest summit in Ireland.

In a deep hollow between the south-eastern flank of this range and the group of Mangerton lies the Upper Lake of Killarney. This beautiful sheet of water, which is three miles in length by three quarters of a mile in breadth, is inclosed on all sides by mountains from 2000 to 3000 feet in height, except at one point, towards its eastern extremity, where it discharges its waters by a tortuous course of three miles between the southern declivities of Glena and the precipitous side of Turk Mountain. A channel leading from the Upper to the Lower Lake passes through a thickly wooded defile. About midway between the extremities of the channel a remarkable detached rock, called the Eagle's Nest, rises over the left bank to a height of 1100 feet. Emerging from this defile, the river expands into the Lower Lake of Killarney, seven miles in length by three in breadth, skirting the eastern declivities of the mountain range of Tomies and Glena. These mountains, descending abruptly to the western verge of the lake, are clothed with the richest natural woods of oak, ash, pine, alder, and beech, intermixed with hazel, whitethorn, yew, holly, and arbutus, from a height of several hundred feet down to the water's edge, through a continuous distance of six miles. O'Sullivan's River, descending by a thickly wooded ravine on this side, forms a cascade 70 feet high, close to the shore of the lake. On the opposite side the low alluvial banks are everywhere broken into promontories and islands, on which the arbutus grows with uncommon luxuriance. The town of Killarney is situated on the plain about a mile from the eastern shore, and half a mile south of Killarney runs the Flesk, the chief feeder of the lake. Several other cascades and richly wooded promontories ornament the borders of the lake. The waters of the Lakes of Killarney discharge themselves at the northern extremity of the Lower Lake through the river Laune, which runs by a course of twelve miles into the head of Dingle Bay.

Mountain ridges, bounding valleys of greater or less width, form the distinguishing features over the greater part of Kerry. The most extensive

tract of open country is near the Limerick boundary; it is drained by the rivers Feale, Gale, and Brick, which, uniting within five miles of the sea, receive the common name of the Cashen River: the united length of their courses is about 50 miles. A rough district extends from the mouth of the Cashen to Beal Point, where the æstuary of the Shannon first assumes the character of a river. The whole coast line, from the Shannon to the Kenmare, contains many good harbours, of which that of Valentia might be made of high commercial value.

The roads in the south-western part of Kerry up to the year 1820 were scarcely passable for wheel-carriages, and there are some parts of the coast between Kenmare and Cahirciveen still inaccessible, except on foot or horseback. But great exertions have been made to establish good roads across the county; and these roads have been very instrumental in developing the resources of the district. No railways yet enter this county, although two or three lines have received parliamentary sanction.

The climate is very moist, from the vicinity of the Atlantic, and the south-western district is much exposed to storms. In the inland parts however, especially in the neighbourhood of Killarney, the air is mild and genial, and vegetation extremely luxuriant.

The geological structure of the chief mountain-chains is similar to that of the mountains in the west of Cork, the main component being a red or gray conglomerate and sandstone supporting flanks of silicious flags, and overlaid in the low districts by fields of floetz limestone. The mountains of Glanbehy abound with iron-ore, which was formerly smelted in considerable quantities at Blackstones, in works erected by Sir William Petty; but, the supply of timber having failed, these works were given up about the year 1750. Iron has been worked in other parts, and copper and lead also exist in the county. The slate quarry in Valentia produces flags and slates to a large amount. The flagging, which is of a very superior description, is transported to London.

The soil of the south-western district, where not encumbered with bogs, is an adhesive loam, fit for the reception of corn crops. The soil of the middle district is a rich loam, which produces excellent crops of grain, and, when laid down in pasture, yields butter of prime quality. The northern district has a stiffer soil, more retentive of wet, and inclined to run to rushes. Cider is made in considerable quantity. The native breed of cattle are very small, but well formed, good milkers, and easily fattened. A breed of small ponies is peculiar to Kerry; they are too light for farming purposes, but answer for the saddle very well.

The chief trade of the county consists in exports of agricultural produce, chiefly oats and butter. The manufacture of linen is carried on with some activity in the neighbourhood of Dingle. There is also a general manufacture of coarse woollens throughout the county for home consumption. Fishing is carried on extensively on the coasts.

Kerry is divided into 8 baronies. It is in the diocese of Limerick, Ardfert, and Aghadoe. It is in the Munster Circuit. The assizes are held at Tralee. The county returns 2 members to parliament, and 1 is returned for the borough of Tralee. The following are the principal towns, with the population of each in 1841:—*Ardfert*, though now a small village, was formerly a place of importance, and the see of a bishop. A part of the ancient cathedral has been fitted up as the parish church. The village is about 6 miles N.W. from Tralee: population, 655. The diocese is now included in that of Limerick, Ardfert, and Aghadoe. *Cahirciveen*, a village, situated on the southern shore of the small sea-bay called Valentia River, has a little quay and harbour, which were constructed in 1822. Population, 1492. *Castle-Island*, about 11 miles E. from Tralee, is a small but improving town. It contains a church and a Roman Catholic chapel. Population, 1687. *Dingle*, on the north shore of Dingle Bay, at the bottom of a capacious and well-sheltered harbour. The town is of considerable size, situated on the slopes of the mountains which rise directly from the shores, but has a wretched appearance. Population, 3386. *Kenmare*, situated at the head of Kenmare Bay, consists of one large street of neat and well-built houses. Population, 1339. *Killarney* is situated a mile and a half from the Lower Lake of Killarney. The town consists mainly of two good streets, from which branch several poor lanes and alleys. In summer, from the influx of visitors to the lakes, the town presents an animated appearance, but is very dull in winter. Here is a venerable old church, a Roman Catholic chapel, a Methodist chapel, and a Lunatic Asylum is now (1849) being erected. Population, 7127. *Listowel* is situated on the north bank of the Feale, about 17 miles N.N.E. from Tralee; it is an improving town, and a place of considerable thoroughfare. A new bridge has been made across the Feale. Population, 2598. *Tarbert* is situated on an inlet of the æstuary of the Shannon, called Tarbert Bay, which affords good anchorage. Population, 1024. *Tralee*, the chief town of the county, and where the assizes are held, is situated on a flat tract of land which extends along the shores at the head of Tralee Bay. It is about a mile from the sea, but is connected with it by a short ship-canal of recent construction. Tralee is one of the most thriving towns of the south of Ireland. Its exports, imports, and general trade have much increased of late years. It contains a handsome court-house, a county prison adjoining, two large Roman Catholic chapels, meeting-houses for Presbyterians, Independents, and Methodists, a county infirmary, fever-hospital, and infantry-barracks. Population, 11,363. Tralee returns 1 member to parliament.

Kerry originally formed part of the kingdom of Desmond, or South Munster, of which the Mac Carthies were sovereigns. About 1177, part of the county came into the hands of Maurice Raymond, from whom the Fitzmaurices, lords of Kerry, draw their pedigree, and the barony of Clanmaurice takes its name. Soon afterwards the Fitzgeralds established themselves in the south of the county, and as earls of Desmond exercised powerful influence until the time of Elizabeth, when their authority was put an end to, and their estates confiscated. From 1641 till 1691 there was

almost a constant series of insurrections and confiscations.

Kerry contains several monuments of a very remote antiquity, of which the most remarkable are the Cyclopean stone fortresses of Cahirconree, Staigue, and Cahir Donnell; and the sepulchral stones with ogham inscriptions in the neighbourhood of Dingle. There is a round tower at Rattoo, one in an island in Loch Currane, and part of another at Aghadoe. There are also the remains of thirteen religious houses and thirty feudal castles.

KERSEYMERE. [Woollen and Worsted Manufactures.]

KERTSCH. [Crimea.]

KESTEVEN. [Lincolnshire.]

KESWICK. [Cumberland.]

KETCHUP. [Mushrooms.]

KETTERING. [Northamptonshire.]

KEUPER, in Geology, the German term for the upper portion of the new red sandstone formation.

KEW. [Surrey.]

KEY, in Music, is the particular diatonic scale in which a composition begins and ends, and which more or less prevails in a given piece of music.

The diatonic scale may commence on any note, and that chosen, called the *Key-Note*, governs the progression of the other notes. [Scale.] If a composition begins and ends in a scale in which neither sharps nor flats are used, it is in the key of C, the distinctive term *natural* being understood. When three flats are placed at the clef, and the last and lowest note in the piece is E ♭, the key is E ♭; and so in other cases.

As any note in the diatonic and chromatic scales may be taken as a key-note, it follows that there are twelve keys in the major mode and twelve in the minor; for each scale may have either a major or a minor 3rd. Hence arise twenty-four keys. But as three major and three minor keys have two designations each (as for example, G ♭ and F ♯, which are merely two different names for the same key or note), there are in name thirty different keys, and as many signatures are in actual use.

KEY ISLANDS are a group of islands of considerable extent in the Indian Archipelago, situated between 5° 20′ and 6° 30′ S. lat., and between 132° 30′ and 133° 40′ E. long. Three islands are rather large, and called Great Key, Little Key, and Key Watela. The number of the smaller ones is not known, as they are rarely visited by Europeans. The three larger islands rise to a moderate elevation above the sea, and all the heights are overgrown with forest-trees, which constitute one of the principal sources of wealth to the inhabitants, who are engaged in ship-building to a considerable extent.

KHAN, a word of Mongol or Turkish extraction, said to mean 'great and powerful lord,' was employed by the nations of central Asia to express the full extent of royal power. This title was assumed by Gengis when he became supreme ruler of the Mongols and Tartars, and was adopted by all his successors. The earlier monarchs of the Ottoman empire were also distinguished by this title. The word is used in Persia in a more restricted sense, and is applied to the governors of provinces, and to all officers of a certain rank.

KHAYA, a genus of plants of the natural family of *Cedrelaceæ*, which is often made a tribe of the *Meliaceæ*. Khaya contains only a single species, *K. Senegalensis*. It forms one of the largest and handsomest of the trees which are found along the banks of the Gambia and in the valleys near Cape Verd. It is valuable for its wood, and medicinally for its bark.

KHERSON, or *Cherson*, a government of European Russia, lying between 46° 12′ and 49° 4′ N. lat., 29° 10′ and 34° 5′ E. long., is bounded N. by Podolia, Kieff, and Pultawa; E. by Ekaterinoslaf; S. by Taurida and the Black Sea; and W. by Bessarabia. Its area is 28,185 square miles, and its population in 1846 was 842,400. Its length from E. to W. is 240 miles, and its average breadth from N. to S. is about 140. The province, which consists of an immense plain, lies between the Dnieper and the Dniester, which respectively bound it on the east and west. The central parts are drained by the Bog [Bog], the Ingul, the Inguletz (a feeder of the Dnieper), and by several smaller streams. The north of the country is diversified by some hills, which are covered with forests. The rest of the country is a treeless steppe overgrown with tall grass, which the great heat of summer withers; vegetation does not revive till the autumn. In the interior the soil is a gray clay mixed with sand, which produces rich pasture. Here and there are heaths, and in the lower parts swamps: on the coast there is a red ferruginous earth, which produces little besides saline plants. There is a great scarcity of spring water in the steppes. The climate is very variable; in summer the heat is from 85° to 90° of Fahr. A dark yellow sky, a wind which raises the dust in clouds, and an immense torrent of rain are the usual precursors of a thunder-storm, which is awful beyond conception. The nights are always cool. The winter is cold: most of the rivers freeze over, though but for a short time. Agriculture is in a backward state; the breeding of cattle and sheep is the chief occupation of the population. Corn, hemp, flax, tobacco, liquorice, saffron, and mustard are grown. The vine is cultivated, and much attention is paid to horticulture. Oxen and buffaloes are numerous, and used for draught; the horses (of which many are wild) are slight, but very spirited and swift-footed; the breed of sheep has been much improved by crossing the common stock with merinos. Wolves, wild-cats, bustards, gray partridges, ortolans, snipes, &c., abound; the country is infested by locusts, large rats, snakes, scolopendræ, lizards, and swarms of gnats. The fisheries on the sea-coast and in the rivers are important. The minerals are—fine potter's clay, freestone, slate, chalk, talc, saltpetre, agates, and garnets. The province is well situated for trade. The foreign commerce of the country is very important and rapidly increasing.

The chief towns are Kherson, Odessa, Elizabethgrad, and Nicolajev. [Odessa.]

Kherson, a large well-built town with 20,000 inhabitants, is situated on the right bank and near the mouth of the Dnieper, which forms a good harbour. It is the seat of the governor of the province, and was formerly important on account of its great naval dockyards, arsenal, and foreign trade. But unhealthiness of site, and the difficulty experienced by large vessels in crossing the bar at the entrance of the harbour, have greatly contributed to its decline.

Elizabethgrad, situated in the interior on the Ingul, has strong fortifications, a large hospital, and about 12,000 inhabitants.

Nicolajev, a well-built town of 15,000 inhabitants, is situated at the confluence of the Ingul and the Bog. It is the seat of the admiralty that directs all the Russian naval operations on the Black Sea. The town is strongly fortified, and has several fine buildings, among which are remarked the principal Greek church, the town-house, the custom-house, the admiralty buildings, and the ship-building yards. It is a place of considerable trade, and has numerous schools and other institutions for the education and improvement of persons devoted to naval and military pursuits.

KHORASAN. [PERSIA.]

KHOSRU I., called Chosroes by the Greek writers, but more commonly known in the East by the name of Nushirwan, 'noble soul,' succeeded his father Kobad in the kingdom of Persia, A.D. 531. Kobad at the time of his death was engaged in a war with Justinian, the emperor of Constantinople; but Khosru, shortly after his accession, concluded a peace with Justinian, on the payment by the latter of 10,000 pounds of gold. Khosru diligently employed this interval of rest in regulating the internal affairs of his kingdom: the corrupt officers and magistrates, who had been appointed during the reign of his father, were removed, and justice was impartially administered in every part of the empire. He divided the empire into the four great provinces of Assyria, Media, Persia, and Bactriana, and established a vizir over each. In the course of a few years he extended his dominions as far as the Indus. He broke his truce with Justinian, and the war continued for many years, till at length Khosru condescended to grant a peace to the emperor in 562, on the annual payment by the latter of 30,000 pieces of gold.

This peace however was only preserved for ten years; and the result of another war was, that a desperate battle was fought between the Greeks and Persians in the neighbourhood of Melitene, in the eastern part of Cappadocia, in which Khosru was completely defeated. He died in the spring of the following year, A.D. 579, after a reign of 48 years, and was succeeded by his son Hormisdas IV.

The virtues, and more particularly the justice, of this monarch form to the present day a favourite topic of Eastern panegyric. His reign forms an important epoch in the history of science and literature: he founded colleges and libraries in the principal towns of his dominions, and encouraged the translation of the most celebrated Greek and Sanskrit works into the Persian language.

KHOSRU II., the grandson of Khosru I., was elevated to the throne of Persia, A.D. 590, on the deposition of his father Hormisdas. In the first year of his reign, Khosru, to escape from the treachery of Bahram, who seized upon the royal power, took refuge in the dominions of Maurice, the emperor of Constantinople, who assisted the Persian monarch to defeat Bahram and obtain repossession of the sovereignty; the assistance was however purchased by the surrender of some important towns of Mesopotamia and the payment of a large sum of money. During the life of Maurice peace was preserved between the two nations; but, on his assassination by Phocas in 602, Khosru took up arms to revenge his death, as he pretended, and in the space of fourteen years subdued almost all the provinces of the Greek empire. Khosru at length, in 621, dictated the terms of an ignominious peace to the Emperor Heraclius, who had hitherto made very few efforts for the defence of his dominions, but who rejected these terms, and in a series of brilliant campaigns (A.D. 622–627) recovered all the provinces he had lost, and repeatedly defeated the Persian monarch. Khosru was murdered, in 628, by his son Siroes.

KIACHTA, a town in the Russian government of Irkutsk, in Siberia, is situated in 50° 20′ N. lat., 121° 40′ E. long., in a sterile country, 2480 feet above the level of the sea, on a small stream also called the Kiachta. It consists of two separate parts—the fortress, called Troitsko-Sawsk (population about 5000), where the custom-house, the imperial offices, and the military government are established, and the lower town, or Kiachta (population 400), which is nearly two miles farther south, and where the Russian merchants live. The commerce of this place with *Maimaitchin*, the Chinese emporium, which is less than a mile from the lower town, has risen to great importance in modern times. The Russians bring to Kiachta furs of the sable, black fox, and ermine; hides, woollen cloth, and other coarse woollen fabrics; glass, looking-glasses, and cattle. They receive in return from the Chinese, manufactured silks and cottons, tobacco, china, furniture, and several kinds of toys; but the principal commodity taken in exchange is tea.

KIDDERMINSTER. [WORCESTERSHIRE.]

KIDNAPPING is defined to be the stealing or conveying away of a man, woman, or child, and is an offence at common law, punishable by fine and imprisonment, and, until the abolition of that mode of punishment by 1 Vict. c. 23, by pillory. The 9 Geo. IV. c. 21, provides for the offence of child-stealing.

KIDNEY-BEAN. [BEAN.]

KIDNEYS are two glands lying in the lumbar region, on each side of the spinal column. They are composed of numberless and delicate tubular ramifications, on whose walls there is a fine network of capillary arteries and veins, and which are all collected into one mass of a firm fleshy consistence, inclosed in a fibrous capsule.

The ureter, through which the urine secreted by the kidney is conveyed to the bladder, dilates at its extremity into a wide pouch, the pelvis of the kidney, which is divided into several portions

called calyces. Into each calyx a nipple-like process, or papilla, projects, at whose extremity there are several minute orifices, each opening into a very fine canal, which, as it is continued into the substance of the kidney, ramifies and becomes tortuous. On all these canals, or tubuli uriniferi, minute blood-vessels ramify, which with a number of rounded bodies called the corpuscles of Malpighi, secrete the urine, which is conveyed from the tubuli into the calyces, and from them through the pelvis and the ureter into the bladder.

Diseases of the Kidneys.—The principal disease to which the kidneys are liable is that which gives rise to the formation of calculi. [CALCULUS, *Renal.*] Sometimes the stone is retained in the pelvis of the kidney, where, by continued depositions, it may increase till it completely fills the pelvis and calyces; but more frequently it passes through the ureters into the bladder, producing in its passage violent spasmodic pain in the loins, sickness and nausea, hæmorrhage, &c. This affection is the most common cause of inflammation of the kidneys (nephritis), from which abscess and other morbid alterations may result. Chronic inflammation seems to be the most frequent cause of a peculiar alteration in the structure of the kidneys, particularly described by Dr. Bright ('Medical Reports'), of which the chief characters are, the interstitial deposition of a pale yellowish and firm substance, and a granular or tuberculated form of the surface of the kidney, with a great decrease of its vascularity. This condition comes on in hard drinkers, and after the scarlet fever; it usually produces dropsy, and is indicated by a dull heavy pain in the loins, a bloated expression of the countenance, a hard pulse, and the secretion of so large a quantity of albumen with the urine that it coagulates on being heated, or on the addition of a little nitric acid. Suppression of urine may be the ultimate result of obstruction from calculi in the ureters, or it may occur as an idiopathic disease. It is a condition of great danger. The kidneys are also subject, in common with other organs, to the deposition of various morbid substances, as cancer, fungus, hæmatodes, melanosis, tubercle, &c. But the diagnosis of all the chronic affections of this organ is extremely obscure, the principal indications of each being the same, viz. the dull heavy pain in the loins, dropsy, and sometimes hæmaturia.

KIEL, the capital of the duchy of Holstein, is beautifully situated on a bay of the Baltic, which forms an excellent harbour, in 54° 10′ N. lat., 10° 8′ E. long. It is 64 miles by railway from Altona and Hamburg, and has 13,000 inhabitants. The town, which is surrounded with walls pierced by five gates, is pretty regularly built, with straight well-paved streets. It has a university, connected with which there is a library of 70,000 volumes. The manufactures consist of linen, hats, tobacco, sugar, &c.; ship-building is carried on. The trade in corn, dried herrings, and dried sprats, is considerable, and has much increased since the completion of the Kieler Canal, which joins the Baltic and the German Ocean, and enters the harbour of Kiel. Steamboats ply regularly to Copenhagen.

KIEN LOONG succeeded his father on the throne of China in 1735, being then twenty-six years of age. The principal events of his long reign are—1. The successful war which he carried on, from 1753 to 1759, against the Olots or Elauts, the Kashgars, and other Tartar nations of central Asia. 2. In 1770 the Turguts, a Mongolian tribe, dissatisfied with the Russian government, having removed from the banks of the Volga, after crossing the steppes of the Kirghis and other tribes, came to place themselves under the protection of China, when Kien Loong gave them a part of the country of the expelled Elauts. 3. In 1773 Kien Loong attacked and conquered the Miao-tse, a race of mountaineers on the borders of the province of Koei-cheow, north-west of Canton. Among the remarkable circumstances of Kien Loong's reign may be mentioned his edict of 1753, forbidding the exercise of the Christian religion under severe penalties, and his reception of the British embassy in 1793.

In February 1796, Kien Loong, having completed the sixtieth year of his reign, abdicated in favour of his son Kea King. Kien Loong died in February 1799.

KIEV, or *Kieff*, a government of Russia in Europe, lying between 48° 30′ and 51° 30′ N. lat., 28° 40′ and 33° 25′ E. long., is bounded W. by Podolia and Volhynia, N. and N.E. by Minsk and Tchernigof, E. by Pultawa, and S. by Kherson. It has an area of 19,339 square miles, and had in 1846 a population of 1,605,800. The surface is in general flat, with a few undulations which follow the course of the rivers. The land in the north of the government of Kiev is extremely rich and fertile; in the south the soil is poorer; but still there are here also tracts of luxuriant corn-fields and good pastures. The whole government belongs to the basin of the Dnieper, which forms the north-eastern boundary for nearly 250 miles. [DNIEPER.] The interior is drained by the numerous feeders of the Dnieper from the left bank, the principal of which are the Pripetz, the Teterev, the Irpen, and the Ros, which rises in the west of the province, and, dividing into two arms, forms with the Dnieper a large island. The climate is mild and dry, and adapted to all the productions of the temperate zone, though no vines are cultivated. The rivers usually freeze in December, and thaw in February; the north wind is always severely felt in winter. The heat is great in summer, during which season rain seldom falls. Locusts often do great injury to the growing crops.

Agriculture is the chief employment of the inhabitants. The soil produces all kinds of corn, pulse, millet, hemp, fruits, flax, and tobacco. Cattle are numerous and of good breed; horses are small; swine are kept in great numbers; sheep are scarce. The forests produce excellent timber. Among the wild animals are foxes, wolves, bears, deer, &c. The minerals are clay, lime, chalk, millstone, and bog-iron. The manufactures are unimportant. The trade consists in the exportation of the produce of the province, and the importation of salt, metal, wine, manufactured goods, and colonial produce. The commerce is chiefly in

the hands of Jews, who are very numerous in this government.

KIEV, the capital of the government of Kiev, is built on a hill on the right bank of the Dnieper, which is here crossed by a bridge of boats, in 50° 27′ N. lat., 30° 27′ E. long., and has 45,000 inhabitants. The town consists of four distinct parts,—the old convent and fortress of Petschersk, in which are the celebrated catacombs, containing the bodies of 118 saints: Old Kiev, which contains the fine cathedral of Santa Sophia, and is the residence of the Russian archbishop: Podol, containing most of the private houses, 20 churches, an imperial palace and town-hall: and Vladimirstadt, which was built by Catherine II. Besides its cathedral, 25 churches, 9 convents, and a Greek ecclesiastical academy, Kiev has a university, founded in 1834, called St. Vladimir's university, which is frequented by students from the governments of Kiev, Podolia, and Volhynia. Kiev contains the oldest Greek ecclesiastical academy in Russia, which was founded in 1588. The university library contains above 46,000 volumes. The manufactures consist of earthenware, leather, &c. A great fair is held in January, which is attended by above 30,000 foreigners. Kiev is the residence of the military governor of the province, and of the United Greek-Catholic bishop.

KILDA, ST., the most western of the Hebrides, is situated in 57° 47′ N. lat., 8° 37′ W. long., and consists of an uneven mountain-ridge, the most elevated point of which rises 1380 feet above the sea-level. The greatest width of the island is about 2 miles, and the length 3 miles. About 100 persons inhabit a village in the island, and live in a great measure on the eggs of sea-birds, which are exceedingly abundant.

KILDARE, an inland county of the province of Leinster, in Ireland, is bounded N. by Meath, E. by Dublin and Wicklow, S. by Carlow, and W. by Queen's County and King's County. It is situated between 52° 50′ and 53° 25′ N. lat., and between 6° 27′ and 7° 10′ W. long. Its greatest length from N. to S. is about 40 miles, and its greatest breadth E. to W. 27 miles. The area is 654 square miles. The population in 1841 was 114,488.

The surface is more flat than that of any other county of Ireland. The only considerable elevations are the hills of Rathcoole, which form the western extremity of the range of the Dublin mountains, and a detached group which occupies part of the southern margin of the Bog of Allen, in the central northern division of the county.

An open table-land divides the middle and southern parts of Kildare into two districts, of which the one slopes gradually towards the river Liffey on the east, and the other towards the river Barrow on the west. The west district is divided into three open vales by low ranges of undulating ground extending in parallel directions from the central table-land towards the south-west. The most northern of these vales contains the rivers Feugile and Little Barrow; but the chief rivers of the county are the Barrow and the Liffey. That part of the valley of the Liffey which is included within this county is formed by the western slope of the Dublin mountains on the one side, and by the subsidence of the table-land of Kildare on the other. The country in this neighbourhood is in a high state of cultivation, and much of it in demesne. The western bank of the river particularly, from the point where it enters the county to Leixlip on the Dublin boundary, is almost wholly occupied by a succession of demesne-lands, including numerous residences of the best class. The Grand Canal, which crosses the Liffey by an aqueduct near Naas, and runs nearly parallel to the Royal Canal across this county, is carried through a tract of bog which comprises about 40,000 statute acres of peat-moss, in some places 40 feet deep, reposing on limestone gravel, which rises in low cultivable ridges between the principal fields of morass. The Island of Allen is an elevated tract of this kind, surrounded by bog, between the summit level of the canal and the town of Kildare.

The north-western part of the county, extending from the Bog of Allen to the Boyne, is open and chiefly in pasture. Besides the Royal Canal, the Grand Canal, and their branches, portions of the Great Northern and Western Railway, and the Midland Great Western Railway, pass through this county.

The climate, from the quantity of boggy surface exposed, is more moist than that of the neighbouring counties on the north and south. In the central district the air is pure and keen, and milder and more salubrious in the valleys of the Liffey and the Greece.

The clay-slate, which flanks the granite axis of the Dublin and Wicklow Mountains, occupies about one-fourth part of the surface of Kildare. The granite tract of Carlow extends into the south-eastern extremity of this county. The remainder of the county is occupied with the floetz limestone of the great central plain, broken only by the group of Dunmurry and the Hill of Allen. The Hill of Allen is composed of a mass of granular compact greenstone and greenstone-porphyry protruded through the floetz limestone.

The soil is generally a rich loam, resting on limestone or clay-slate. The chief tract of pasture-land in this county is the Curragh, which is used as a sheep-walk. There are rich fattening lands in the baronies of Carberry, Clane, and North and South Salt, which occupy the north-western and north-eastern portions of the county. An improved system of agriculture has been introduced by the resident proprietors, and is practised to some extent by the smaller farmers. Oxen are in general use both for draught and the plough. There are many corn-mills in the county.

The only manufactures carried on within the county are of cottons and woollens, but to a very limited extent.

Kildare is divided into 14 baronies. It is in the Home Circuit. The assizes are held at Athy and Naas alternately. The county returns 2 members to parliament. There are no parliamentary boroughs. The following are the principal towns, with the population of each in 1841:—*Athy.* [ATHY.] *Celbridge*, situated on the

northern bank of the Liffey, 13 miles W. from Dublin, contains a church and Roman Catholic chapel. Population, 1289. *Kildare*, 32 miles S.W. from Dublin, is a small and poor town, which contains a Roman Catholic chapel, nunnery, and friary. Population, 1629. The bishopric of Kildare is attached to the archbishopric of Dublin and Cashel. *Leixlip*, a small town beautifully situated on the Liffey, 11 miles W. from Dublin. Population, 1086. *Maynooth*, 15 miles W. from Dublin, is a small town, consisting of a single street, and having a population of 2129. Maynooth is chiefly distinguished for the Royal College of St. Patrick, founded in 1795 for the education of the Roman Catholic priesthood. The buildings form three sides of a quadrangle, the principal front of which is 400 feet long. A new building, from a very indifferent design by Pugin, is now (1849) in progress. The college grounds occupy 80 acres. *Naas*, which alternately with Athy is the assize town for the county of Kildare, is 20 miles S.W. from Dublin. A branch of the Grand Canal passes it, and it is a place of considerable traffic. There is a county court-house and a new gaol, a modern church in the pointed style, a large modern Roman Catholic chapel, a dispensary, county fever hospital, and union workhouse. Population, 3571.

In the ancient division of Ireland the present county of Kildare was divided among many families. The Fitzgeralds became the ruling family in Kildare about the close of the 13th century, and maintained their authority, with many fluctuations, to the 16th. This county was the theatre of various military operations during the wars which succeeded the rebellion of 1641. The Kildare family were active in bringing about the Restoration, and espoused the Protestant cause in the subsequent wars of the Revolution of 1688.

Numerous earthen works, partly military and partly sepulchral, remain in this county. There are numerous sepulchral mounds on the Curragh, and pillar-stones of large dimensions in other places. There are round towers at Kildare, Taghadoe, Kilcullen, Castledermot, and Oughterard. There are also ruins of numerous religious houses in this county. At Castledermot, Moone, and Old Kilcullen, are stone crosses ornamented with curious sculptures. There are seventeen ancient castles remaining, of which those of Kilkea, Donadea, and Leixlip are still inhabited.

KILFENORA, formerly a bishop's see in the archiepiscopal province of Cashel, in Ireland, is now in the archbishopric of Dublin and Cashel, and is included in the united bishopric of Killaloe, Kilfenora, Clonfert, and Kilmacduagh.

KILIAN, the name of a distinguished family of engravers of Augsburg. Heineken enumerates twenty-one, of whom eighteen were artists, and fourteen of these were engravers. The following four were engravers of superior ability.

Lucas Kilian was born at Augsburg in 1579. He engraved numerous prints, and was considered one of the best engravers of his age. He died at Augsburg in 1637.

Wolfgang Kilian was born at Augsburg in 1581, and, as his brother Lucas had done, studied also in Venice. His greatest work is the 'Celebration of the Westphalian Peace in Augsburg in 1649,' in two sheets, after a picture by Sandrart: it contains about fifty portraits. He died at Augsburg in 1662.

Bartolomæus Kilian, son of Wolfgang, born at Augsburg in 1630, was a very able artist both with the graver and the etching-needle. Sandrart terms him a born engraver: his works are very numerous, but are chiefly portraits. He died at Augsburg in 1696.

Philipp Andreas Kilian, closely related to the above, was born at Augsburg in 1714. He studied in the Netherlands and in various parts of Germany, and became one of the most distinguished artists of his time. He visited Dresden in 1751 for the purpose of conducting the execution of a collection of prints after the most celebrated pictures of the Dresden Gallery, but the project was interrupted by the breaking out of the Seven Years' War, in 1756. He then published a series of illustrations of the Bible in quarto, with the assistance of various other artists, to the number of 130 prints, but they are not among his best works. He executed many portraits; two of the best of which are the Emperor Francis I. and Maria Theresa. He died in 1759.

KILKENNY, an inland county of the province of Leinster in Ireland, is bounded N. by Queen's County, E. by Carlow and Wexford, S. by Waterford, and W. by Tipperary. It lies between 52° 13′ and 52° 53′ N. lat., and between 6° 55′ and 7° 38′ W. long. Its greatest length N. to S. is about 45 miles; its average breadth is about 20 miles. The area is 796 square miles. The population in 1841 was 202,420.

The navigable rivers Barrow and Suir form the greater part of the eastern and the whole of the southern boundary of Kilkenny, and the partly navigable Nore traverses its entire length from north to south-east. The northern part of the district between the rivers Nore and Barrow is occupied by a hilly tract of country, spreading into numerous lateral groups, the general direction of which is from north-north-east to south-south-west. These valleys are watered by the rivers before named, and by the minor rivers Dian, Dineen, Dubhglass, Owenree, Munster River, and Clodagh. The ranges of hills have various designations in different parts of the county; such as Castlecomer Hills, Slievenaman Range, Brandon Mountain, Coppinach Range, Walsh Mountains, and King's Mountain. The county contains a considerable number of small towns and villages; and in the most picturesque spots are many beautiful mansions and parks. Five miles south-east of Ballyragget is the remarkable cave of Dunmore. The entrance is by a picturesque hollow clothed with brushwood, at the extremity of which the cavern opens by a natural arch fifty feet high. There are several chambers within, incrusted with stalactites and traversed by a subterranean stream. Beyond the central district nearly all the southern part of the county is occupied with hilly tracts, connected on the east with the granite group of

Carlow, and on the west with the range of Slievenaman. A tongue of alluvial land called the Roer, extending above two miles in length, occupies the south-eastern extremity of the district at the point of junction of the Nore and Barrow. With the exception of this spot the western bank of the Barrow from Graigue to the Nore is precipitous, and in some places clothed with natural wood. The space between the southern declivities of the Walsh Mountains and other groups ranging towards Tipperary and the Suir is occupied to a breadth of from two to five miles by a level tract of rich land. The river Suir is navigable for vessels of 120 tons up to the bridge of Carrick. At the bridge of Waterford it is in some places eight fathoms deep at low water. The Barrow is navigable to a considerable distance from its mouth. The general slope of the surface is to the south-east, which is the best aspect both for sun and shelter. Surface waters run off rapidly, and there is very little bog; the air is consequently dry and healthy.

With the exception of the mountain groups of the south, the entire surface of Kilkenny is occupied by the limestone of the central plain, overlaid in the hilly districts north of Kilkenny city by shale and sandstone. The coal formations are nearly co-extensive with the hilly districts; the limestone, where it forms the surface-rock, spreads into undulating plains sweeping round the hilly tracts, and occupying the intermediate valleys. These coal-beds would be of great commercial value, if the natural resources of Ireland were better developed. The general colour of the limestone is a blueish gray. Near Kilkenny it passes into a fine black marble, containing a great variety of shelly impressions. These beds are extensively quarried, and the blocks dressed on the spot by a saw-mill driven by the Nore. The marble, which is sometimes procured of a jet-black, is manufactured into chimney-pieces, tombstones, &c.: it bears a very high polish, and can be raised in large blocks. Marl is found in large deposits in various parts of the county. The mountain tract occupying the south of Kilkenny, with the exception of the primitive group of Brandon, consists of a nucleus of clay-slate surrounded by sandstone. There are many chalybeate springs in the county.

There is but a small portion of Kilkenny unfit for tillage. The hills of the northern districts are round-backed and accessible; and the Walsh Mountains are for the most part pasturable. The group of Brandon is the only considerable extent of rough land in this county. In the coal-tract the soil is a moory turf lying over a stiff whitish clay, which is the poorest district out of the mountain region. Many districts have deep rich soils. The soil of the hilly country on the south is dry and kind, but it is badly inclosed and destitute of shelter. Some of the best wheat and meadow lands in the south of Ireland are situated in the level tract along the Suir. About one-third of the level districts is in tillage. There are two districts almost wholly occupied by dairy-farmers, the Walsh Mountains and the southern part of the Castlecomer tract. In the southern dairy district the sour milk is used for fattening pigs for the Waterford market: in the northern district the milk is sold, there being no convenient market for pork.

The manufacture of carpets, diapers, and tapestry was introduced into the county by the Countess of Ormonde in 1359. James, duke of Ormonde, about the middle of the seventeenth century, established and encouraged, at a great expense, both linen and woollen manufactures; and about the close of the same century the Bessborough family introduced the manufacture of linen into the southern parts of the county. None of these branches of trade however, nor that of blankets, introduced about a century ago, have continued on anything like an extensive scale. A coarse frieze for home consumption is made among the peasantry. There are many flour-mills in the county.

Kilkenny is divided into 10 baronies. It is in the diocese of Ossory, Ferns, and Leighlin. It is in the Leinster circuit, and the assizes are held in the city of Kilkenny. It returns 3 members to parliament, namely, 2 for the county, and 1 for the city of Kilkenny. The following are the principal towns, with the population of each in 1841:—*Ballyragget* is on the east bank of the Nore, about 10 miles N. by W. from Kilkenny. The ruins of the castle built here by the Butlers in the 15th century are extensive and interesting. Population, 1777. *Callan* is on the N.E. bank of King's River, an affluent of the Nore, about 10 miles S.W. from Kilkenny. It is an ancient place, was formerly walled, and there are ruins of fortified castles and an abbey. Population, 3111. *Castlecomer*, about 10 miles N.E. by N. from Kilkenny, is a well-built and clean little town, with a court-house, church, and a Roman Catholic chapel. Population, 1765. *Freshford*, 8 miles N.W. by N. from Kilkenny, is a small town in a fertile tract of land, which extends from the Nore westwards to the Bog of Allen at Urlingford. Population, 2075. *Graig*, or *Graigue-na-managh*, is beautifully situated on the west bank of the Barrow, about 15 miles S.E. from Kilkenny. There are some interesting ruins of an abbey, part of which have been converted into a Roman Catholic chapel. Population, 2248. *Kilkenny* is the capital of the county. [KILKENNY.] *Thomastown* is situated on both banks of the Nore, 10 miles S. by E. from Kilkenny, the larger portion occupying the left side. A handsome stone bridge crosses the river. The situation is beautiful, and well suited for trade, but it is notwithstanding a poor place. Population, 2348.

Kilkenny, as part of Leinster, belonged to the Earl of Pembroke in the early part of the 13th century; but, on the death of the earl in 1247, Kilkenny passed into the hands of various proprietors. The early history of the county is chiefly occupied with the feuds of the family of Ormonde against the houses of Desmond or Kildare. The Graces also during this period were engaged in perpetual hostilities with the Fitzpatricks, Kavanaghs, and other Irish families. During the civil war against Charles I., Kilkenny was mostly held by opponents to the crown.

Circular stone inclosures of the Pagan æra remain on the summits of the hills of Cloghmanta near Freshford, and Tory Hill, or Slieve Grian, near Kilmacow. The latter appears to have been a sepulchral cairn, inclosing a kistvæn, or stone chamber. The covering stone of the cromlech at Kilmogue is 45 feet in circumference, and is elevated at one end 15 feet from the ground. Another cromlech at Ballyheniberry, has a covering stone 16 feet long, 10 feet broad, and 3 feet thick. There are numerous similar monuments of smaller dimensions throughout the county. The remains of raths and earthen tumuli are also of frequent occurrence. There are five round towers, one adjoining the cathedral church of St. Canice in Kilkenny, the others at Kilree, Tullocherin, Fertagh, and Aghaviller. Of the monastic ruins, the most extensive and interesting are those of Jerpoint Abbey, on the Nore, two miles from Thomastown. The ruins occupy three acres, and are a fine specimen of the mixed Anglo-Norman and early English architecture. There are also monastic ruins at Graig and other places. The castles are very numerous, the chief one being Grandison Castle in Iverk, an ancient seat of the Butlers. It has three round towers towards the Suir, and two court-yards.

KILKENNY, a city and county of a city, the capital of the county of Kilkenny, is finely situated on both sides of the Nore, the older and principal part occupying the western bank, 73 miles S.W. from Dublin. Kilkenny takes its name from the cathedral church of the diocese of Ossory, founded here about the end of the twelfth century. The place was selected by the early Anglo-Norman invaders for the site of a castle. The present castle, built in 1195, occupies a commanding site on the west bank of the Nore. The cathedral is seated on a gentle eminence on the same side of the river, at the opposite extremity of the city. The small river Bregah running into the Nore about midway between these points divides the city of Kilkenny Proper from Irishtown or St. Canice, the former having originally been a dependency on the castle, the latter on the cathedral. The large suburb on the opposite side of the river is connected with Kilkenny Proper and Irishtown by two handsome bridges.

The chief object of antiquity is the cathedral church of St. Canice. It is a cruciform building, surmounted by a low tower: it extends from east to west 226 feet, and from north to south 123 feet. The chapel of St. Mary in the north transept serves as parish church. The oldest parts of the building appear to be of the architecture of the early part of the thirteenth century. Of the original castle there remain three massive towers worked into large additions, in the French taste of the seventeenth century, made by James, duke of Ormonde, in 1682. The building occupies three sides of a quadrangle, having a garden and fountain in front and a lofty terrace towards the Nore. The abbey-church of St. John's has been converted into a parish church. Black Abbey has been partly restored, and converted into a church for Roman Catholics. The body and tower of the Franciscan friary are still standing.

The town is well built, and has a busy and cheerful appearance, particularly that portion of it constituting Kilkenny Proper. The building material is usually stone whitened or dashed with rough-cast. The town contains a county court-house, county prison, city prison, infirmary, fever hospital, union workhouse, cathedral, 2 parish churches, 7 Roman Catholic chapels, 2 monasteries, a convent, Presbyterian and Methodist meeting-houses, an endowed grammar-school called the College of Kilkenny, and a Roman Catholic college.

The blanket manufacture, although much decayed, is still carried on to some extent. But the corn and general retail trade now form the principal business of the town.

The city of Kilkenny returns one member to parliament. The county of the city comprises an area of 26½ square miles. The population of the city, in 1841, exclusive of the rural portion, was 19,071; the population of the rural portion was 4554: total, 23,625.

KILLALA, an Irish bishopric in the archiepiscopal province of Armagh, is now united with Tuam and Achonry, thus forming the united bishopric of Tuam, Killala, and Achonry.

KILLALOE. [Clare; Kilfenora.]

KILLARNEY. [Kerry.]

KILLARNEY, Lakes of. [Kerry.]

KILLESHANDRA. [Cavan.]

KILLIGREW, THOMAS, a younger son of Sir Robert Killigrew, was born at Hanworth in Middlesex, in 1611. He travelled in his youth, and attended Charles II. during his exile. His coarse and licentious wit qualified him peculiarly for securing the favour of his master. On the Restoration Killigrew became groom of the bedchamber, and enjoyed an intimacy and influence with the king which the first men in the nation were unable to obtain. He died at Whitehall in 1682. He wrote eleven plays, of which the first two were printed in 1641, and the whole collection in a folio volume in 1664. A sufficient specimen of them is furnished by the comedy of 'The Parson's Wedding,' reprinted in Dodsley's 'Old Plays.'

KILMACDUAGH. [Kilfenora.]

KILMAINHAM. [Dublin.]

KILMARNOCK. [Ayrshire.]

KILMORE. [Elphin.]

KILRENNY. [Fifeshire.]

KILRUSH. [Clare.]

KILWINNING. [Ayrshire.]

KIMBOLTON. [Huntingdonshire.]

KIMCHI, DAVID, a celebrated Jewish rabbi was born in the 12th century, in the south of France, and passed the greater part of his life at Narbonne. David Kimchi was chosen, in 123 arbiter of the controversy between the Spanish and French rabbis respecting the opinions of Maimonides. He died about the year 1240. The most important of his works are, a Hebrew Grammar, Venice, 1545, and frequently reprinted, and 'A Dictionary of Hebrew Roots,' Naples, 149 Kimchi also wrote commentaries on almost all the books of the Old Testament.

KIMOLOS. [Argentiera.]

KIN. [CONSANGUINITY; DESCENT.]

KINCARDINESHIRE, or the *Mearns*, as it is commonly called, is a maritime county of Scotland, situated between 56° 43′ and 57° 5′ N. lat., and between 1° 47′ and 2° 30′ W. long. It is bounded N. and N.W. by Aberdeenshire, S. and S.W. by Forfarshire, and E. by the North Sea. Its greatest length, N. to S., is 32 miles; its greatest breadth, E. to W., is 24 miles. The area is 360 square miles. The population in 1841 was 33,075.

The Grampian Hills occupy the western and central parts of Kincardineshire. Mount Caerloch, the highest summit in this county, is 1890 feet above the sea-level. This elevated and sterile region comprises about one-third of the county. The rest, to the extent of 100,000 acres, is level and well cultivated.

The mineralogy of this county is not of great importance. In many places there are limestone quarries; and, as the stone is of excellent quality, a more abundant supply of fuel is all that is wanted to render them of great value. There are also sandstone quarries.

The principal rivers are—the Dee on the north, and the North Esk on the south. [ABERDEENSHIRE; FORFARSHIRE.] The other streams, the Dye, Cowie, Carron, Bervie, and Luther are small, but some of them contain good salmon fisheries. The weaving of dowlas, household linen, &c., is the chief manufacture of the county.

The county returns one member to parliament. The following are the principal towns, with the population of each in 1841 :—

Bervie, or *Inverbervie*, is situated on the coast, about 9 miles S. by W. from Stonehaven. The Water of Bervie, a small river, falls into the sea a little below the town, and forms a harbour for fishing boats at the village of Gourdon. A handsome bridge crosses the river. There is a town-house, over which is a belfry, with a bell, which is rung four times a day, for the convenience of the inhabitants. Population of the town, 864. Bervie is included in the Montrose parliamentary district, which returns one member.

Johnshaven is a village on the coast, with a small harbour, about 4 miles S. by W. from Bervie. Population of the village, 1172.

Laurencekirk, a village, about 6 miles W. from Bervie, contains a parish church and an episcopalian chapel. Population of the village, 1365.

Stonehaven, the county town, is situated near the mouth of the Carron River, about 14 miles S. by W. from Aberdeen. It possesses an excellent harbour, sheltered on the S.E. by a high rock, which runs out into the sea, and on the N.E. by a quay, well adapted for the loading and unloading of goods. To the north of the old town, but adjoining to it, is the new town of Stonehaven, which in point of wealth and population is of much greater importance than the other. It has risen suddenly, and is rapidly increasing. Population of the old and new town, 3012.

KING. The signification of this word is a person in whom are vested the highest executive functions in a sovereign state, with a share, more or less limited, of the sovereign power.

It is immaterial whether the power of such a person is limited only by his own will, or immemorial usage and written laws, or in any other way; still such a person is a king. Nor does it signify whether he succeed to the kingly power by descent and inheritance on the death of his predecessor, or is elected by some council or limited body of persons, or by the suffrages of the nation. There was a king of Poland, who was elected; there is a king of England, who now succeeds by hereditary right.

The distinction between a king and an emperor is not one of power, but it has an historical meaning. [EMPEROR.]

The word *king* is of pure Teutonic origin, and is found slightly varied in most of the languages which are sprung from the Teutonic. The French, the Italian, the Spanish, and the Portuguese use the Latin word *rex*, only slightly varying the orthography according to the analogies of each particular language.

There are other words employed to designate the person who is invested with the chief power of particular states, in using which we adopt the word which the people of those states use, instead of the word *king*. Thus there is the *Shah* of Persia, the grand *Sultan*, and formerly there was the *Dey* of Algiers. In the United States of America certain powers are given by the federal constitution to one person, who is elected to enjoy them for four years with the title of *President*; this is also the case in France. A *Regent* is a person appointed to exercise the kingly office during the minority or the mental incapacity of the real king: this definition at least is true of a regent of the British empire.

Nothing can be more various than the constitutional checks in different states on the kingly power, or, as it is more usually called in England, the royal *prerogative*.

The English kingly power is traced to the establishment of Egbert, at the close of the eighth century, as king of the English. The accession of William, duke of Normandy, after the battle of Hastings, A.D. 1066, is generally regarded as a new beginning of the race of English kings, for William was but remotely allied to the Saxon kings. In his descendants the kingly office has ever since continued; but, though the English throne is now hereditary, there has not always been regular hereditary succession; it has been often disturbed. The last disturbance was the succession of William III., after the abdication of James II., when an act was passed excluding the male issue of James, the issue of his sister the Duchess of Orleans, and the issue of his aunt the Queen of Bohemia, with the exception of her youngest daughter the Princess Sophia, and her issue, who were Protestants. On the death of Queen Anne this law of succession took effect in favour of King George I., son of the Princess Sophia.

The heir now succeeds to the throne immediately on the decease of his predecessor. The course of descent is to the sons and their issue, according to seniority; and, if there is failure of male issue, the crown descends to a female. The person who succeeds by descent to the crown of

England succeeds also to the kingly office in Scotland and Ireland, and in all the possessions of the British empire.

At his coronation the king makes oath to three things:—that he will govern according to law; that he will cause justice to be administered; and that he will maintain the Protestant Church. [CORONATION.]

His person is sacred; and he is not personally responsible for any of his acts. His concurrence is necessary to every legislative enactment. He sends embassies, makes treaties, and enters into wars, without any previous consultation with parliament. He nominates the judges and the other high officers of state, the officers of the army and navy, the governors of colonies and dependencies, the bishops, deans, and some other dignitaries of the Church. He calls parliament together, and can at his pleasure prorogue or dissolve it. All hereditary titles are derived from his grant. He can also grant privileges of an inferior kind, such as markets and fairs.

But the exercise of any or all of these powers is practically limited. The king cannot act politically without an agent, and this agent may be brought to account for his acts if he transgress the law. The agents by whom the king acts are his ministers, whom the king selects and dismisses at his pleasure; but practically he cannot keep a ministry which cannot command a majority in the House of Commons; and, virtually, all the powers of the crown are exercised by the chief minister, or prime minister for the time. [CABINET.] The king now does not even attend the cabinet councils; and the power which in theory belongs to his kingly office, and in fact in earlier periods was exercised by him, is now purely formal. But, though the King of England has lost his real power, he has perfect security for his person, and for the transmission to his descendants of all the honour and respect due to the head of the most extensive empire on the globe.

KING, WILLIAM, Archbishop of Dublin, born 1650, died 1729, was a native of Ireland. He is the author of two works on subjects of deep importance. One of these, 'The Inventions of Men in the Worship of God,' was intended to reconcile the Presbyterians of Ireland to the episcopal form of church order. But his greater work is his treatise on that difficult subject the Origin of Evil, which is written in Latin. He printed also a sermon on the consistency of Divine Predestination and Fore-knowledge with the Freedom of Man's Will. He was made Dean of St. Patrick's, in 1688; in 1691 he was made Bishop of Derry; and in 1702 Archbishop of Dublin.

KING, PETER, LORD, was born in 1669, at Exeter, where his father was a tradesman. His mother was a sister of John Locke, by whose advice it is said Peter was sent to study at the university of Leyden. In 1691 he published the First Part of his 'Inquiry into the Constitution, Discipline, Unity, and Worship of the Primitive Church,' which displayed considerable learning, attracted much attention, and caused some controversy. Meanwhile King had entered himself at the Inner Temple, and was in due course called to the bar. He began very early to make a figure in his profession; and he soon entered upon a political career, having in 1699 obtained a seat in the House of Commons as one of the members of Beeralston, which he retained for seven parliaments, or to the end of the reign of Queen Anne. In July 1708, he was chosen Recorder of London, and was soon after knighted. In 1709 he was appointed by the House of Commons one of the managers in the impeachment of Dr. Sacheverell; and in 1712 he gave his services, without a fee, as one of the counsel for Mr. Whiston, on his trial for heresy before the Court of Delegates. In Nov. 1714, a few months after the accession of George I., Sir Peter King was made Chief Justice of the Common Pleas, and in June 1725 was appointed Lord Chancellor, and raised to the peerage as Baron King, of Ockham, in the county of Surrey. Lord King however did not as chancellor satisfy the public expectation, and is said to have injured his health by his labours to make himself master of the department of professional learning necessary for his new duties. He resigned the seals on November 26, 1733, and died at his seat of Ockham on July 22, 1734.

KING'S BENCH. [COURTS.]

KING'S COLLEGE, Cambridge, was founded by King Henry VI. in 1443, in conjunction with Eton College, whence the scholars are supplied by a regular succession. [ETON COLLEGE.] The royal foundation consists of a provost and 70 fellows and scholars. In 1848 the number of the members of the senate was 104, of the undergraduates 14, and of members on the boards 126.

King's College and Trinity Hall are the only colleges at which undergraduates can be elected fellows; in King's College, however, they are obliged to take the degrees both of B.A. and M.A. in the university, when of sufficient standing; otherwise they are not entitled to the full proportion of their dividends.

The original buildings of King's College consisted of the present chapel and a quadrangular court to the north of it. The buildings which constituted this court having become much decayed, it was determined that a large quadrangle should be erected to the south of the chapel. Gibbs was appointed the architect. The building was commenced in 1724, and he erected on the west side of the quadrangle the Fellows' Building, or Grecian Building, as it is commonly called. No thing more was done till 1824, when the new buildings were recommenced by Wilkins, and completed in 1828.

The quadrangle is 280 feet in length by 27 feet in breadth, and consists of the hall, library, chapel, and apartments for the fellows and scholars. The Grecian Building, hall, and library are handsome structures; but the architectural boast of King's College is the chapel, the only part of the original buildings which now remain. The first stone was laid in September 1447. In 1508 Henry VII. gave 5000*l.* towards the completion of the building, and his executors, in 151 under a power conferred by his will, gave a further sum of 5000*l.* for the same purpose. In July 1515, the exterior, including the roofs, w

completed. In 1526 an agreement was made for the painted windows. The screen and stalls were not finished till about 1534.

The interior of this magnificent chapel is 291 feet long, 45½ feet wide, and 78 feet high. The exterior appearance of the chapel, with its towers and buttresses, lofty windows, pinnacles, and pierced battlements, is as beautiful as it is grand and imposing. In the interior the vast stone roof, unsupported by pillars, is one of the wonders of architectural skill. Eleven principal ribs spring from the buttresses on each side, forming an arch somewhat flattened at the centre, whence ponderous stones, each of which is said to weigh a ton, hang as pendants. The principal ribs are connected with each other by diagonal ribs, and the whole roof is formed into one great whole of the lightest and most richly carved fan-tracery. The great east window and twenty-four side windows, each nearly 50 feet high, are filled with painted glass, and form a series of scriptural pictures of exceeding beauty. The great west window alone is of plain glass, probably for the sake of additional light.

KING'S COLLEGE, London. [UNIVERSITY OF LONDON.]

KING'S COUNTY, an inland county of the province of Leinster, in Ireland, is bounded N. by West Meath, E. by Kildare, S. by Queen's County and the county of Tipperary, and W. by the river Shannon, which separates it from Galway and Roscommon. The greatest length, E. to W., is 45 miles; the greatest breadth, N. to S., is 39 miles. The area is 772 square miles. The population in 1841 was 146,857.

A series of low limestone hills, running in a north-easterly direction, divides the northern portion of the county into two districts of unequal area, of which the one discharges its waters eastward to the Barrow; and the other, which is of about double the extent of the former, westward into the Shannon. This range of eminences terminates in the north-eastern part of the county, in the conical hill of Croghan, from which the Yellow River flows northward into the Boyne. The northernmost part of the county is well cultivated; but this is succeeded on the south by peat-bog, forming a portion of the great Bog of Allen. This tract, extending about 12 miles every way, is divided into two principal valleys by the Philipstown and Cushina rivers, which flow into the Barrow. The highest part of the bog is 286 feet above the level of the sea. There are numerous other bogs in this county. The valley of the Barrow, which consists on the King's County side of an arable margin interposed between it and the Bog of Portarlington, is highly cultivated, and to a considerable extent occupied by the demesnes of the resident gentry. The district westward of the range of hills is watered by several small tributaries of the Shannon, among which are the Brosna, Clodagh, Frankford, and Blackwater. In this district, as in the eastern, the bogs are very numerous. The bogs on the western side of Tullamore, lying along the southern side of the Grand Canal, occupy an area of 11,588 acres. They are disposed in three principal tracts, separated from one another by low hills of limestone gravel, and bounded on the south by the hill of Cloghan, which separates the bogs immediately bordering on the canal from the more extensive tract lying between its southern declivity and the range of Slieve Bloom. This latter tract, consisting of five principal fields, extends over 23,986 acres. The valley of the Brosna is the best cultivated portion of the north-western division of the county. The river winds between undulating banks, which form a margin of considerable breadth on each side, free from bog, and towards West Meath spread into a well-cultivated open country. The district included between the Brosna and the county of West Meath, with the exception of the arable margin of the river, is almost wholly occupied by bogs. One of the bogs of this district is the Bog of Kilmaleady, now generally known as the 'moving bog,' which in the year 1821 burst its bounds and flowed nearly a mile and a half down an adjoining valley.

The remaining portion of the county, included between the Slieve Bloom Mountains, Tipperary, and the Shannon, has a general slope towards the Little Brosna, which forms the boundary between King's County and Tipperary. The portion which slopes immediately to the Shannon is bleak and moory, comprising a considerable portion of the bogs lying south of Cloghan Hill; but the banks of the Shannon are richly clothed with meadow, though liable to frequent floods. The valley of the Little Brosna is an undulating well-inhabited district, containing extensive tracts of pasture, and towards the mountains abounding with varied and pleasing scenery. The highest elevation of the Slieve Bloom Mountains is 1689 feet. They extend in a line from north-east to south-west, through a distance of 15 miles. A narrow pass, called the Gap of Glandine, is the only point of communication throughout this line available for purposes of general traffic. The navigation of the Shannon, adjacent to King's County, is aided by three lateral cuts or canals, at Meelick, Banagher, and Shannon Bridge. Many steam-boats ply on this part of the Shannon.

Notwithstanding the great extent of wet ground on the surface of King's County, the climate is neither damp nor unwholesome. This is partly accounted for by the antiseptic quality of the peat-bog, and partly by the fact of the county lying comparatively high and open.

The floetz limestone of the central plain spreads over the entire area of the county, with the exception of the portions occupied by the protruded masses of the Slieve Bloom chain and the Hill of Croghan. The range of Slieve Bloom consists of a nucleus of clay-slate, supporting flanks of sandstone. Croghan Hill consists of a protruded mass of trap conglomerate, rising about 500 feet above the level of the surrounding country, with steep declivities towards the south. The hill is almost all under cultivation, and yields the most abundant white and green crops without any manure whatever. Massy strata of greenstone appear also between Croghan Hill and Philipstown. Granular limestone occurs at the Seven Churches in the north-west of the county, and has been quarried to the extent of 3000 cubic feet of good gray

marble. Banks of rolled limestone gravel, called eskers, occur frequently throughout the floetz limestone district. The bogs, which occupy so large a portion of the county, generally repose on limestone-gravel.

The soil in general is not naturally fertile, but can be made to yield very good crops in the arable districts by manuring with the lime and bog-stuff which abound throughout the county. The banks of the Shannon, where they are occasionally overflowed, afford considerable tracts of fine meadow. The chief grazing districts in the county lie on the borders of West Meath, where the pastures are considered very favourable to wool-growing.

The linen manufacture is carried on to a small extent; and there is a little weaving of friezes, stuffs, and serges, for home use. Distilling, brewing, and corn-grinding occupy a few hands.

King's County is divided into 12 baronies. It is in the dioceses of Meath, Killaloe, and Kildare. It is in the Home Circuit, and the assizes are held at Tullamore. It returns 2 members to parliament. There are no parliamentary boroughs. The principal towns, with the population of each in 1841, are the following:—*Banagher* is 82 miles W. by S. from Dublin, on the east bank of the Shannon, at one of the guarded bridges across the Shannon to Connaught. The town consists principally of one very long street, occupying elevated ground. It has a considerable trade in the export of corn and other provisions. A spacious church and a Roman Catholic chapel are both of modern erection. Population, 2827. *Edenderry* is 37 miles W. from Dublin. The Grand Canal passes within a mile of the town, to which a branch has been extended. It contains a town-hall and a church, and is a neat and clean town. Population, 1850. *Parsonstown*, formerly and still generally called *Birr*, is 79 miles W.S.W. from Dublin. The town is situated on a gentle acclivity, on the north bank of the Little Brosna. The modern parts of the town are laid out in good streets and squares, and respectably inhabited. The church and the Roman Catholic chapel are handsome edifices. The surrounding country is fertile and flourishing, and the town has an extensive retail trade. Population, 6336. *Portarlington* is situated on both sides of the Barrow, the largest portion being in Queen's County. [Queen's County.] *Tullamore*, the assize town of the county, is situated near the centre of that vast mass of peat-moss called the Bog of Allen, 59 miles W. by S. from Dublin. The Grand Canal passes it on the north side, and the stream called the Tullamore River flows through the town. It is regularly built, with wide streets, and is a respectable-looking town. The court-house, gaol, church, and Roman Catholic chapel are conspicuous and rather handsome buildings. Tullamore is, from its central situation, a place of considerable trade. There is daily communication with Dublin, by means of swift iron boats, and the canal-boats to and from Ballinasloe and Limerick all call there. Population, 6343.

Although not reduced to shire-ground as one county until the time of Mary, King's County was partially included in other shires at a very early period. In 1557 the act was passed which erected the whole into one county under its present name. Before that period it was generally designated Western Glenmalery, to distinguish it from Eastern Glenmalery, the present Queen's County. The native chieftains for a length of time struggled against the new settlement, until A.D. 1600, when the Lord Deputy Mountjoy and Sir Oliver Lambert succeeded, after a deplorable destruction of life and property, in finally reducing them. This county, like others, was involved in the rebellion of 1641; and extensive confiscations followed.

The ruins of the seven churches of Clonmacnoise, in the north-western part of this county, form one of the most interesting groups of ecclesiastical remains to be met with in the island. The buildings are of various dates, from, probably, the seventh century to the twelfth. Surrounding the abbey of St. Kieran of Clonard is the ancient burying-ground, containing about two Irish acres, and occupied with the sites and ruins of various religious houses. The whole is inclosed with a wall, at two of the angles of which are ancient round towers. The buildings within the precincts are chiefly chapels, erected over family burying-places by the various Irish kings and chieftains. There are the remains of several other religious houses in the immediate vicinity. The entire group occupies a gently swelling bank, rising from the Shannon about midway between Shannon Harbour and Athlone. Twenty-eight other religious houses are enumerated in this county. There are numerous remains of feudal castles, chiefly of the Elizabethan æra, of which those of Cloghan, Leap, and Birr are still inhabited.

KING'S EVIL. [Scrofula.]

KING'S LETTER. [Brief.]

KINGFISHERS, *Halcyonidæ*, a family of the *syndactyle* group of *Passereaux*, according to Cuvier; and according to Mr. Vigors, of the *Fissirostral* tribe of his order *Insessores*. [Insessores.] For other modes of arrangement see Linnæus, Latham, Lacépède, Duméril, Meyer, Illiger, Vieillot, De Blainville, &c.—Consult also Mr. Vigors 'On the Natural Affinities that connect the Orders and Families of Birds;' the Prince of Musignano, in his 'Tabella Analitica de' Generi' ('Specchio Comparativo,' 1827); and Eyton's 'History of the Rarer Species of British Birds;' also Selby, Gould, Yarrell, &c. Swainson's 'Classification of Birds' (1836) may be referred to with advantage.

The *Halcyonidæ* are universally distributed, being found alike in the old and new world, Australia, and the islands of the Southern Ocean. The genera included under this family title are very numerous, and the species differ considerably from each other in habits. Most are piscivorous, darting upon their finny prey when it approaches near the surface of the water. Others however, as the Puff-Birds (*Tamatia*), are insectivorous; and others, as the Gigantic or Great Brown Kingfisher of New Holland (*Dacelo gigantea*), feed upon large insects, reptiles, and even small quadrupeds, being unfitted, from the character of their plumage, for plunging into water.

When we say that the Kingfishers are *syn*

tyle, we mean that the external toe before is united for the greater part of its length to the

Gigantic Kingfisher (*Dacelo gigantea*).

middle toe, as in the Bee-Eaters (*Merops*) and others.

Mr. Swainson, in the 1st volume of his 'Classification of Birds' (1836), when treating of the *syndactyle* foot, allows the term to be good, if limited to such feet, with united toes, as are of a different formation to all others, and would not, even if the toes were free, come under any of the definitions which he had previously given. Such a form of foot, he says, will be found in the genera *Merops* and *Alcedo*, containing the Bee-Eaters and Kingfishers, to whose feet he especially limits the term *syndactyle*. 'The habits of these two groups,' continues Mr. Swainson, 'as far as concerns the use of their feet, are nearly the same, for in neither are these members ever employed but to rest the body. The Kingfisher watches patiently from a fixed station, generally a naked twig overhanging the water, for such fish as come within its reach, and then, after a time, flies to another station, where it alights and remains. The feet, from not being used for walking or standing, are consequently very small, and the toes imperfectly developed; there are three toes in front and one behind, but two of the former might be almost reckoned as only one, since they are united together even to the commencement of their respective claws, and the inner toe is not half the length of the others, and seems to be rudimentary: it has a claw, and is rather more detached at its tip than the other two; in some, as in the Three-Toed Kingfishers, this inner toe disappears. The hinder toe is very short, and scarcely longer than the inner one. The scales of the whole foot are so thin and transparent that they can scarcely be seen in the small species by the naked eye. Those who have seen so much of the true Kingfishers, so scarce in England, but so common in tropical America, know that they never perch upon any other than small or slender branches; and this we may infer from the shape of the foot. The two outer anterior toes are very long, so that they would completely clasp two-thirds of the circumference of a small branch, the other third being embraced by the hinder toe. This fact is further confirmed by the unusual flatness of the soles of all, and by the acuteness of the claws, which, from being but slightly curved, would not upon a small branch come into contact with the wood. The union of the three anterior toes, by producing considerable breadth of sole, gives an unusual degree of steadiness to the bird, highly conducive to its remaining very long in one position.'

The following characters are assigned by Mr. Swainson to the *Halcyonidæ*:—Wings rounded, not formed for rapid flight. Feet very feeble. Toes in pairs.

He makes the family consist of the following genera and subgenera:—Genus *Tamatia*, comprising *Tamatia*, Cuv.; *Capito*, Vieill.; *Lypornix*, Wagler; *Monassa*, Vieill.; and *Brachypetes*, Sw.—Genus *Halcyon*, Sw., including *Dacelo*, Leach; *Halcyon*, Sw.; *Syma*, Lesson; *Todiramphus*, Lesson; and *Ceyx*, Lacépède.—Genus *Alcedo*, Linn., comprehending *Alcedo; Ispida*, Sw.; *Tanysiptera*, Vigors; and *Alcyone*, Sw.—Genus *Lamprotila*, Sw.—Genus *Galbula*, Brisson. The whole of the genera are sedentary, watching for their food from a fixed station, which they only quit as soon as their prey approaches sufficiently near to come within the sweep of their wings; if unsuccessful in their first attack, they do not pursue their game, but return again to their post, and patiently wait for another luckless straggler; if their first attack is successful, they return with their victim to the same station, and then proceed to swallow it. Of the *Halcyonidæ* one species only is British, viz. the Common Kingfisher (*Alcedo ispida*), so remarkable for the brilliancy of its plumage. This is the *Martin Pêcheur* of the French; *Uccello della Madonna*, *Uccello Santa Maria*, *Piombino*, and *Alcione*, of the Italians; and *Gemeine Eisvogel* of the Germans. The habits of this species are described by Pennant, Montagu, Selby, Gould, Yarrell, and others.

Common Kingfisher (*Alcedo ispida*).

KINGHORN. [FIFESHIRE.]

KINGS, THE BOOKS OF, the name of two books of the Old Testament. They originally formed only one book in the Hebrew text. In

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the Septuagint they are divided into two books, and are entitled 'the third and fourth books of reigns' or kingdoms, since the first and second books of Samuel are called in this translation the first and second books of Kings. These books, in common with the books of Chronicles, and many others of the Old Testament, are generally ascribed to Ezra; but neither the author nor the time in which they were written can be determined with any degree of certainty.

KINGSBRIDGE. [DEVONSHIRE.]
KINGSCLERE. [HAMPSHIRE.]
KINGSCOURT. [CAVAN.]
KINGSTON. [JAMAICA.]
KINGSTON-ON-HULL. [HULL.]
KINGSTON-ON-THAMES. [SURREY.]
KINGSTOWN. [DUBLIN.]
KINGTON. [HEREFORDSHIRE.]

KINIC ACID, sometimes called Cinchonic Acid, is obtained from cinchona bark. It has a very sour taste; it reddens litmus paper strongly, is unalterable in the air, dissolves in 2½ times its weight of water at 48°, and is also soluble in alcohol. The crystals contain one equivalent of water. The acid is composed of oxygen[9], hydrogen[9], and carbon[15].

Kinic acid combines with other substances to form *Kinates*. Among them the following are the most important. *Kinate of Quina* is very bitter, readily soluble in water, and but slightly in alcohol of sp. gr. 0·837. It is decomposable by heat, without residue. By evaporation the solution is reduced to a viscid paste, which when moistened and exposed to the air exhibits rudiments of crystallisation. It is composed of kinic acid[1], quina[2]. *Kinate of Cinchona*, composed of kinic acid[1], cinchona[2], is bitter, very soluble in water, and slightly in alcohol. *Kinate of Lime* (kinic acid[1], lime[1], water[10]), crystallises in rhomboids and hexagonal plates; it has little taste; it is soluble in water.

Kinic Acid may be artificially combined with most of the metals, and thus forms *Kinate of Potash, Kinate of Soda, Kinate of Zinc, Perkinate of Iron, Kinate of Lead, Kinate of Copper, Perkinate of Mercury, Kinate of Silver.*

KINNEIR, SIR JOHN MACDONALD, was the representative of two ancient families in Scotland, the Macdonalds of Sanda, on his father's side, and the Kinneirs of Kinneir, on that of his mother. He bore the name of Kinneir during the active part of his life, and it is the one by which he is best known to the public; but in the latter part of his life he resumed his paternal name. While yet a youth, he commanded a company of fencibles of his own clan, and was on service in Ireland during the rebellion.

Narrow circumstances, and his own active disposition, led him to accept a cadet's appointment to Madras, where he arrived in 1808. He obtained a staff appointment with some troops serving in Malabar, where he fell ill, and went to Persia at the period of Sir John Malcolm's mission to that country in 1809. His services from this period were active, incessant, and important. He was first despatched to examine the country from Shiraz to Shuster, and to return by Ram Hormuz, a journey in which he had ample opportunity of displaying both courage and perseverance. After making several other journeys in Persia, he was sent by Sir John Malcolm from Bagdad across the desert of Syria. He was attacked, wounded, and stripped of his property, by some Arab freebooters, and compelled to return to Bagdad; he hardly waited to recover, but proceeded again on his route to England. When at home, he published his 'Geographical Memoir of the Persian Empire.'

Sir John Kinneir, when in England, married Amelia, third daughter of the late General Sir Alexander Campbell; but his period of repose was brief. He undertook to examine a portion of Asia Minor, and to proceed to the Black Sea into Kurdistan, in order to explore the routes by which a European enemy could advance towards India. His journey through Asia Minor, &c., in 1813–14, gives a full account of the mode in which this service was performed. In 1824 he was appointed town major of Madras, and agent to the Nawab of the Carnatic. His health was restored, but he was still eagerly anxious for active employment. Lord Amherst at length gave him the opportunity he desired; he was selected in 1826 to occupy the high and arduous station of British envoy at the court of Persia.

It belongs to history to record the actions of Sir John Kinneir during the few but eventful years he had been British envoy in Persia. His success in overcoming obstacles, apparently insurmountable, was complete, and it was effected without a pledge that could either politically or financially embarrass his country.

Sir John Kinneir had a mind singularly stored with knowledge. He bore a very high private character. His love of truth was his predominant characteristic, and to this he doubtless owed his extraordinary success as a diplomatist.

KINO, an astringent substance, the concrete juice of one or more plants, the identification of which is a matter of dispute among botanists. From India, Africa, Australia, and the West Indies, concrete juices are brought, which, correctly or not, obtain the name of Kino. These different extracts differ in their chemical habitudes with re-agents, but they all agree in possessing a strong astringent power. Kino most commonly occurs in grains of a shining aspect and rich ruby-red colour; they are easily reduced to powder. It is nearly entirely soluble in water and in alcohol. Vauquelin analysed that sort which is termed African, and found it to consist of 75 per cent. of tannin, 24 of red mucilage, and 1 of woody fibre.

KINROSS. [KINROSS-SHIRE.]

KINROSS-SHIRE, a small inland county of Scotland, bounded E. and S. by Fifeshire, and W. and N. by Perthshire. It lies between 56° 9′ and 56° 18′ N. lat., and between 3° 14′ and 3° 35′ W. long. Its greatest length, E. to W., is 11 miles, and its greatest breadth, N. to S., is 10 miles. The area is 70 square miles. The population in 1841 was 8763.

The borders of the county are hilly, but the interior, comprising about one-half of the whole, may be regarded as a plain, slightly varied by

gentle undulations. The soil is various, chiefly inclining to gravel. Some portions consist of a clayey loam, and are tolerably fertile, but in the more elevated parts the surface consists of moor land, and forms excellent pastures. The climate, though cold, owing to the general elevation of the land, has been rendered much drier by an extensive system of drainage.

There is some coal in the south, where the county borders on Fifeshire. There are also freestone quarries of good quality in that quarter. To the north of Kinross red freestone is the geological formation of the district. The higher hills are whinstone or basalt.

This county contains several fresh-water lakes, some of which are well stocked with pike, and the rest with perch, eel, and other fish. Of these lakes the principal is *Loch Leven*, which, although inferior in magnitude and picturesque beauty to Loch Lomond, is still a noble piece of water, covering a surface of near 3300 acres. Its height above the level of the sea is about 300 feet. Its greatest depth is from 80 to 90 feet. It contains four islands, the largest of which is called the Inch. The lake abounds in fish, particularly trouts, pikes, perches, and eels.

The chief streams are the Garny, the South Queich, and North Queich, all of which fall into Loch Leven. The waters which flow from Loch Leven form the river Leven, which, after a course of about 14 miles, passing through a part of Fifeshire, falls into the Frith of Forth at Largo Bay.

Clackmannan and Kinross-shire together return 1 member to parliament.

Kinross, the county-town, is situated on the western shore of Loch Leven, 19 miles N.N.W. from Edinburgh. The lower part of the town is mean, but it rises towards the north, where there are many handsome houses. There is a modern parish church. Kinross is a post-town, but the market seems to have been transferred to Milnathort. The population of the town of Kinross in 1841 was 2062.

Milnathort, 2 miles N. from Kinross, has a market on Wednesdays, though it is only considered a village. Population, 1605.

KINSALE. [Cork.]

KINTORE. [Aberdeenshire.]

KIPPIS, ANDREW, D.D., F.R.S., born 1725, died 1795, was descended of ministers who had left the church in 1662, on the passing of the Act of Uniformity, and was educated in a dissenting academy at Northampton. After a few years spent in the exercise of his ministry at Boston in Lincolnshire, and at Dorking in Surrey, he settled in London, in 1753, as pastor of a congregation of Presbyterian dissenters in Westminster. In 1763 he became a tutor in an academy for the education of dissenting ministers in London. In 1771 he was elected a Fellow of the Society of Antiquaries, and in the next year a Fellow of the Royal Society.

Dr. Kippis was a principal contributor to the 'Monthly Review.' He had also much to do with the conduct of 'The New Annual Register.' But the work with which his name is most honourably connected is the republication of the 'Biographia Britannica,' with a large addition of new lives, and a more extended account of many persons whose lives are in the former edition of that work. Five large folio volumes were published of the work, and yet it had proceeded no farther than fo the name of Fastolf. He was also the editor of the collected edition of the works of Dr. Nathaniel Lardner, and of the ethical and theological lectures of his tutor Dr. Doddridge.

KIRCHER, ATHANASIUS, born at Geysen, near Fulda, in 1602, was educated by the Jesuits, and became professor of philosophy and Oriental languages in the college of Würzburg. He afterwards filled the chair of mathematics in the Gregorian College at Rome, for eight years, and resigned it in order to devote himself entirely to his favourite studies. He collected a valuable museum of antiquities, which he left to the Roman college, and which has been repeatedly illustrated. He died at Rome, in November 1680. His works are numerous; but his best is 'Latium, i.e., nova et parallela Latii tum veteris tum novi Descriptio,' &c., fol., Amsterdam, 1671, with maps and figures, and a minute description of Hadrian's villa, with a plan of it.

KIRKALDY. [Fifeshire.]

KIRKBY LONSDALE. [Westmorland.]

KIRKCUDBRIGHT. [Kirkcudbright, Stewartry of.]

KIRKCUDBRIGHT, THE STEWARTRY OF, is a maritime county in Scotland, bounded N. and N.W. by Ayrshire; E. and N.E. by Dumfriesshire, from which it is in part separated by the river Nith; S.W. by Wigtonshire and Wigton Bay; and S. and S.E. by the Solway Frith. It lies between 54° 43′ and 55° 19′ N. lat., and between 3° 33′ and 4° 34′ W. long. Its length E. to W. is about 48 miles; its breadth varies from 17 to 30 miles. The area is 882 square miles. The population in 1841 was 41,119.

The coast, except in the upper part of Wigton Bay, is generally bold and precipitous. The surface of the county is rugged and barren, more particularly towards the sea-coast. About 110,000 acres are cultivated. The rest of the surface, amounting to about two-thirds, is mountainous. The chief elevations are Blacklarg in the north, which rises to the height of 1950 feet above the sea; Cairnsmuir in the west, 2598 feet; and Criffel, a detached mountain on the shore of the Solway Frith, 1831 feet.

Oats are the grain chiefly cultivated. The potato crops are considerable, and constitute a principal article of export to England, after supplying the inhabitants and feeding a great number of swine.

The county contains a variety of minerals, but they have been only in few instances turned to any profitable account, which is mainly owing to the total absence of coal and the general scarcity of other fuel. Lime, coal, and freestone are all imported from the opposite coast of Cumberland. Besides the numerous lakes distributed over the stewartry, all which are of small extent there are two principal streams, the Dee and Urr. The former has its source near the north-western boundary of the shire, and falls into the Bay of Kirkcudbright. The salmon fisheries on this

river are valuable. The Urr rises in a lake of the same name on the borders of Dumfriesshire, and discharges itself into the Solway Frith. The county does not seem to possess any manufacture of importance.

The stewartry of Kirkcudbright is included in the parliamentary district of Dumfries, which returns 1 member to parliament. The principal towns, with the Population of each in 1841, are the following :—

Castle-Douglas, a burgh of barony, situated near the centre of the county, has a very large weekly market for agricultural produce. This town is quite modern, and has increased with great rapidity. The streets are wide, and cross each other at right angles. There is a town-hall, and the post-office embraces a wide extent of delivery, with many sub-offices. Population, 1847.

Gatehouse-of-the-Fleet, a burgh of barony, is situated chiefly on the east bank of the river Fleet, near its entrance into Wigton Bay. A bridge crosses the river, and about one-fifth part of Gatehouse is on the west bank. Vessels of 160 tons can come up the river to Gatehouse, a distance of about three miles from the mouth. Population of the town, 1832.

Kirkcudbright, the county town, is situated on the eastern bank of the æstuary of the Dee, about 5 miles from the mouth of the Bay of Kirkcudbright, and 85 miles S. by W. from Edinburgh. It was anciently a burgh of barony, but it was erected by James II. into a burgh of regality in 1455. The town is irregularly built, and consists of two principal streets at right angles to each other. The public buildings are a court-house, custom-house, and prison. The harbour has one side of wood and two sides of stone. The river opposite the harbour is 20 feet deep at neap tides, and 400 feet wide. Coals and lime are imported from Cumberland in large quantities, and some foreign timber is imported. Wheat, oats, potatoes, and other agricultural products, are exported. Population, 2692.

Maxwell-Town, a burgh of barony, is situated on the west bank of the Nith, opposite Dumfries, with which it is connected by two bridges. The streets of the old part of the town are narrow and crooked ; those of the new part are straight, and sufficiently wide. There is a court-house, beneath which is a gaol. There are two foundries, two roperies, a damask manufactory, and 4 nurseries, in which grapes and other rarer fruits are raised by artificial heat in great perfection. Population, 3230.

KIRKDALE CAVE. This cavern in the oolitic limestone, not far from Kirkby Moorside in Yorkshire, is remarkable for a great quantity of bones, chiefly of extinct animals, which were found in it, and which gave occasion to the publication of Dr. Buckland's geological work, the 'Reliquiæ Diluvianæ.' This cave had a nearly level floor, parallel to the limestone strata. Its extent was 245 feet; the height varied from 3 to 6 feet or more. On the rocky floor was generally a bed of mud, covered over by an irregular layer of sparry stalagmite, formed by the dropping of water containing carbonate of lime in solution ; and it was in this stalagmite and in the mud below it that the bones were found. Of the animals to which the bones belonged 6 were Carnivora, hyæna, felis, bear, wolf, fox, weasel ; 4 Pachydermata, elephant, rhinoceros, hippopotamus, horse ; 4 Ruminantia, ox, and three species of deer ; 4 Rodentia, hare, rabbit, water-rat, mouse ; 5 Birds, raven, pigeon, lark, duck, snipe. The bones were almost universally broken. The remains of hyænas were the most abundant of all the bones ; their teeth were found in every condition, from the milk-tooth to the old worn stump : and, from the whole evidence, Dr. Buckland adopted the conclusion, in which almost every subsequent writer has acquiesced, that Kirkdale Cave was a den of hyænas, during the period when elephants and hippopotami (not of existing species) lived in the northern regions of the globe, and that they dragged into it for food the bodies of animals which frequented the vicinity.

KIRKHAM. [Lancashire.]

KIRK SESSIONS. [Sessions, Kirk.]

KIRRIEMUIR. [Forfarshire.]

KIRWAN, RICHARD, was born in Ireland about the middle of the last century, and died in 1812. He was educated by the Jesuits of St. Omer's. On the death of his brother, he succeeded to the family estate, left St. Omer's, and devoted himself to the study of science. His knowledge was extensive and his memory accurate ; but he does not appear to have contributed any very remarkable original discovery.

In 1781 the Copley medal was awarded to him by the Royal Society. He was for some time president of the Royal Irish Academy, and was elected member or associate of most of the literary societies of Europe. His memoirs are diffused through the 'Transactions' of the Royal Society of London, those of the Royal Irish Academy, and other publications. One of his most remarkable separate works was 'An Essay on the Constitution of Acids.' In 1794 he published 'Elements of Mineralogy,' in 2 volumes 8vo. His 'Essay on the Analysis of Mineral Waters' contains a statement of what had been previously done on the subject, with directions for conducting the requisite processes.

KISTNA. [Hindustan.]

KITCHEN-GARDEN. In laying out the grounds of a country residence provision should be made for the site of the kitchen-garden. Though it should not obtrude on the ornamental ground immediately adjoining the house, the design of the whole should be so formed as to leave the kitchen-garden in the most favourable situation with regard to aspect, soil, and water. The aspect should be open to the south, but sheltered on other sides, more especially from northerly and easterly winds, by rising ground or lofty trees at some distance. The surface should be nearly level, or in some cases, according to the pervious nature of the subsoil, it may be quite so ; but, generally speaking, a gentle slope from north to south is best. The soil should consist of a rich loam, neither too light nor so adhesive as to be liable to bind strongly in dry weather. The depth of soil ought not to be less than two feet,

and more is absolutely necessary for some kinds, of vegetables.

Much injury is done to vegetation by watering with cold spring water, or indeed with any water that is much colder than the soil and atmosphere in which the plants are placed. Plants, when not watered at all in dry weather, if they are only kept alive, succeed better when rain does come than others that are watered, or rather chilled with water, at a comparatively low temperature. Water for the kitchen-garden should therefore be derived from ponds or large reservoirs fully exposed to the sun, and even these should be supplied by open rather than underground channels.

The quantity of ground which a kitchen-garden should contain must be regulated according to the number of individuals which it is required to supply. An acre is calculated to afford a tolerable supply for sixteen individuals, but much depends on the nature of the vegetables required. Potatoes, turnips, peas, and carrots are frequently obtained of better quality and at less expense from a field than from a garden.

The form of a kitchen-garden should be composed of straight lines. If rectangular, it will prove a saving of labour; for it is practically known that more time is required to trench a piece of ground of a triangular form, than if the same extent were in the shape of a square or parallelogram. A range of forcing-houses is generally placed on the north side; and, as the wall on that side is the most valuable for fruit-trees on account of its direct south aspect, it becomes desirable that it should be extended as much as possible on one or both ends of the range.

The interior departments of the kitchen-garden are usually bounded by fruit-trees planted within two or three feet of the walks. Not only are bushes, such as gooseberries, currants, and raspberries, used for this purpose, but fruit-trees of various kinds. The latter are trained either as dwarfs by grafting apples on paradise stocks, and pears on quinces, and causing their branches to proceed from near the ground, or as espaliers.

Very few of the subjects of kitchen-garden cultivation are indigenous; they are chiefly varieties of luxuriant habits, which are artificially maintained and augmented by the art of the cultivator. The principal means employed for rendering the soil of the kitchen-garden subservient to this purpose are,—the application of abundance of manure; trenching, digging, and otherwise stirring the soil; and a due rotation of crops. Manure supplied in abundance will generally produce luxuriance in vegetables, although sometimes a disagreeable rankness is communicated to the flavour. This is in a great measure corrected by trenching, which becomes occasionally highly necessary; and, although expensive, it will always repay the cost, if judiciously performed, particularly if the soil be of a consolidating nature.

It is always advantageous to attend to a proper rotation of crops, especially where manure is not abundantly applied, nor trenching performed. One kind of plant should not immediately follow another of the same nature, or one closely allied.

KITE. [FALCONIDÆ.]

KITTIWAKE. [LARIDÆ.]

KIVA. [TURKISTAN.]

KIZIL ERMAK. [ANATOLIA.]

KLAPROTH, MARTIN HEINRICH, was born at Wernegerode in Upper Saxony, on Dec. 1, 1743. After passing seven years in the public laboratory at Quedlinburg, and two years in that of Hanover, he went to Berlin, and in 1770 to Danzig; he afterwards returned to Berlin as an assistant to Valentine Rose, one of the most distinguished chemists of the day, and on his death in 1771 he succeeded him. In 1780 he underwent the necessary forms and examinations for the profession of an apothecary. His thesis 'On Phosphorus and Distilled Waters' was printed in the 'Berlin Memoirs' for 1782.

His various analyses and contributions to chemical science were collected in 1796, under the title of 'Contributions to the Chemical Knowledge of Mineral Bodies;' the last and sixth volume appeared in 1815, about a year before the death of the author. Besides this work, which contained 207 treatises, he published a Chemical Dictionary jointly with Professor Wolff, and he superintended a new edition of Gren's 'Manual of Chemistry.' He died at Berlin, Jan. 1, 1817.

KLAPROTH, JULIUS HEINRICH VON, was born at Berlin on the 11th of October, 1783. He was the son of the chemist Klaproth, who wished to bring him up to his own profession, but the boy was not inclined to it, and employed most of his time on other pursuits unknown to his father. He learned Chinese secretly without the help of a master. His father, perceiving that he devoted his time exclusively to Oriental languages, sent him, in 1801, to the university of Halle, to study the classical languages. Klaproth remained several years at Halle, when the learned Count John Potocki, having heard of Klaproth, proposed to him to enter the service of the Emperor Alexander of Russia. Upon his arrival at St. Petersburg, early in 1805, the Russian government being then engaged with the plan of sending an embassy to China, Count Potocki obtained for Klaproth the place of an interpreter. Klaproth set out alone, and, after having traversed the Ural Mountains, he arrived at Irkutzk. Count Golowkin, the ambassador, and his suite arrived soon after, in October 1805, and the embassy crossed the Chinese frontier on the 1st of January, 1806. Count Golowkin having refused to submit to the Chinese court-ceremonial, the embassy returned to St. Petersburg. Klaproth took a solitary route through Southern Siberia, and only reached the Russian capital in the beginning of 1807. Before the end of the year he was sent on a scientific mission to the Caucasian provinces. He returned, in January 1809, with a large stock of information, most of which afterwards formed the subject of separate works and articles in learned periodicals. During his stay in Russia, he was active in establishing a school of Oriental languages at Wilna, and in making a descriptive catalogue of the Chinese and Mandshu MSS. in the imperial library at St. Petersburg. He was sent in 1811 to Berlin, to superintend the engraving of the characters which were intended for

printing those MSS. In 1812 he tendered his resignation to the Russian government, and after some time received permission to leave. No sooner was Klaproth free than he began to bring out his journal of his travels in the Caucasus; but Germany became the theatre of a long and bloody war, and the learned Orientalist fled from place to place without finding repose for his pursuits. During this war he became acquainted with some of the most distinguished men in the French armies, and his name became known to Napoleon. Klaproth was at Paris during the hundred days after Napoleon's return from Elba. On the re-establishment of the Bourbons, he was at Florence, in rather uncomfortable circumstances. Count John Potocki, having heard of this, invited him to settle in Paris, and there Klaproth lived some time by his pen, when he accidentally met with William von Humboldt, and upon his recommendation the King of Prussia, Frederick William III., conferred upon Klaproth the honorary title of royal professor of Oriental languages and literature, with a liberal pension. Klaproth was allowed to stay in Paris as long as he pleased. Enjoying an income which enabled him to gratify his love of pleasure and refined society, Klaproth exhibited an extraordinary activity, and it was in the years subsequent to 1816 that he published most of those literary productions which established his reputation. After long and painful sufferings Klaproth died suddenly, on the 27th of August, 1835.

Klaproth was one of the best scholars and decidedly the best linguist of an age which can justly boast of great linguists. His penetration and sagacity, and the quickness of his perception, were extraordinary; clearness and perspicuity distinguish his style; and his memory was so happy and capable of retaining the most different impressions without ever confounding them, that he seldom made more than scanty extracts. When he began a work, it was already clear and distinct in his mind, and the composition did not take him more time than was required for the mechanical art of writing. A list of his chief works is given in the 'Penny Cyclopædia.'

(*Biog. Universelle; Neuer Nekrolog der Deutschen;* Querard, *La France Littéraire.*)

KLE'BER, JEAN BAPTISTE, according to the best authorities was born at Strassburg in the year 1754. He was brought up to the profession of an architect, and sent to Paris at an early age to complete his studies; but he soon left Paris for Munich, where he entered the military college of that city, and, at the completion of his college career, was appointed to a sub-lieutenancy in an Austrian regiment. He served seven years in that corps, which he left in 1783, in order to return to his native country. He there resumed his former profession, and obtained the situation of inspector of public buildings at Béfort in Upper Alsace.

The breaking out of the French Revolution opened to him a more brilliant career. He enlisted as a private soldier in the grenadier company of the battalion of volunteers which had been raised in the department of the Upper Rhine. By his bravery and talents he soon attained the rank of adjutant-major. At the siege of Mainz in 1793 he displayed considerable courage and judgment: his services were rewarded by the rank of adjutant-general, and shortly afterwards he became brigadier-general. He continued in active employment, and to rise in rank, until at the battle of Fleurus (June 26, 1794) he commanded the left wing of the French army, and by his skilful manœuvres greatly contributed to the victory. When Bonaparte was appointed to the chief command of the army for Egypt, he made it a special request to the Directory to be allowed to take him as one of his generals of division. At the siege of Alexandria, on the first landing of the French forces, he was wounded in the head while gallantly climbing the ramparts, but he did not retire from the conflict till he had received a second and a severer wound. He continued to act with Bonaparte throughout the campaign in Egypt, and when, after the repulse from Acre in 1799, Bonaparte resolved to abandon Egypt, he appointed Kléber his successor. He did not however, at first justify the favourable opinion formed of his talents for command. He seemed to despond, and opened a communication with the Grand Vizier for evacuating Egypt. After many debates and frequent delays, a convention was signed at El Arish, on January 28th, 1800, by which it was agreed that the whole of Kléber's army should return to Europe, with its arms and baggage, either on board their own vessels or some furnished by the Turks. The English admiral, Sir Sidney Smith, though not vested with full authority from his government to conclude such a convention, had entered into it. The British government had, however, previously despatched orders to Lord Keith to refuse his consent to any treaty in which it was not stipulated that the French army should be considered prisoners of war; and a letter from this admiral reached General Kléber, warning him of his intention to detain any vessel returning to Europe by virtue of a capitulation. The French commander immediately ordered the evacuation of the strongholds to be stopped, and prepared to resume hostilities. On the night of March 19th, 1800, Kléber drew up his army, which was 12,000 strong, on the plain fronting the ruins of Heliópolis. Before them was the Ottoman army, amounting to upwards of 40,000 men. The contest commenced, and after an obstinate fight the Turks were defeated with great slaughter, Cairo was occupied, and the Mameluke commander, Mourad Bey, concluded an honourable convention with the French commander. Thus, within a month of the battle of Heliopolis, the French were again in possession of their previous conquests.

Released from immediate danger, Kléber now began to direct his energies to more pacific labours, and to apply them to the administration of the conquered country, but on June 14th, 1800, he was assassinated by a religious fanatic named Suleiman, and with him perished the hopes of the eastern expedition.

KLEIST. [GERMANY—*Literature.*]

KLINGENSTIERNA, SAMUEL, a Swedish mathematician and philosopher, was born in 1689

at Tolefors, near Linkoeping, and received his education at Upsal. In 1727 he set out from Sweden for the purpose of improving himself by travelling; and, after passing through parts of Germany and France, he made a visit to England, whence he returned in 1730. Shortly afterwards he was appointed professor of mathematics, and subsequently the tutor of the Prince Royal of Sweden, afterwards Gustavus III.

On the termination of this duty, he quitted the court, and passed several years in retirement; during which time he wrote his work entitled 'Tentamen de Definiendis et Corrigendis Aberrationibus Radiorum Luminis Sphæricis refracti, et de Perficiendo Telescopio Dioptrico,' St. Petersburg, 4to., 1762.

In 1754 he transmitted to Dollond an account of his experiments on light; and his paper led that artist to make others, in the course of which he discovered the combination of lenses which constitute the achromatic telescope.

Klingenstierna wrote a dissertation on the height of the atmosphere, which is printed in the 'Memoirs of the Royal Society of Upsal' (1723); he published, in Latin, an edition of Euclid's 'Elements,' and a translation in Swedish of Musschenbroek's 'Physics.' He was early made a member of the Royal Society of Upsal; and he was afterwards a member of the Academy of Sciences at Stockholm. He was elected a Fellow of the Royal Society of London in 1730; and in the 'Philosophical Transactions' for 1731 there is a paper by him on the quadrature of hyperbolic curves. He died Oct. 28, 1785.

KLOPSTOCK, FRIEDRICH GOTTLIEB, was born at Quedlinburg, in 1724, of respectable parents. In his sixteenth year he went to the school at Naumburg, where his poetical character was first developed. In 1745 he studied theology at Jena, where he projected the first canto of his 'Messiah,' and in 1748 the first three cantos appeared. The excitement created by this poem was surprising. He visited Switzerland in 1750, and Copenhagen in 1751, where he was received with the greatest respect, and introduced to the king, Frederick V. In 1754 he went to Hamburg, and there married a lady who in 1758 died in childbed. He composed in 1764 his 'Hermannsschlacht' (the battle of Arminius), which is scarcely so much a drama as a lyric poem in a dramatic form. His other dramas are of a similar character. In 1771 he settled at Hamburg, where he completed his 'Messiah,' and in 1792 married a second wife. His 'Odes' are generally more read and valued than his 'Messiah' or his dramas. He died in 1803.

KNAPPIA, a genus of plants belonging to the natural order *Gramineæ*. There is only one species of Knappia, *K. agrostidea*, an elegant but very small grass, with a small fibrous root, having numerous stems and short rough leaves. It is found in sandy maritime pastures, but is a rare grass.

KNARESBOROUGH. [YORKSHIRE.]

KNAUTIA (named after Christopher Knaut, a German botanist), a genus of plants belonging to the natural order *Dipsaceæ*. There are a few species of *Knautia* natives of Europe. The only British species is *K. arvensis*, with purple flowers, in large convex long-stalked heads.

KNELLER, GODFREY, was born in 1648, in the city of Lubeck, and received his first instruction in the art of painting in the school of Rembrandt. He afterwards became a pupil of Ferdinand Bol. At Rome, Venice, and Hamburg, he met with very great success. In London, he was state painter to Charles II., James II., William III., Queen Anne, and George I.

Kneller had much of the freedom of Vandyck, but less nature. His beauties of the court of William III. are inferior, and tame, in comparison with Sir Peter Lely's beauties of the court of Charles II. Sir Godfrey died in 1726, at the age of 78.

KNIGHT, KNIGHTHOOD. During the feudal system the military strength of the nation was measured by the number and efficiency of the knights whom the king was able to summon to the field. By distress the king could compel those who held knight's fees [FEUDAL SYSTEM] to take upon themselves the order of knighthood, or to prove by their reception into that order that they had received the training, and possessed the arms and accoutrements, and were, as to other requisites, qualified to take the field as knights.

That power of distraining upon persons till they received knighthood, or compounded with the king by way of fine, which originally was a means of enforcing the performance of a duty to the crown, by persons holding a certain property in the country, was perverted into a process for extorting money from those who would have been exempt at common law, which regulated the amount of a knight's fee by the sufficiency of the land to support a knight, and not by its fluctuating nominal value in a debased currency. This oppressive proceeding, which was occasionally resorted to in the reigns of Edward VI. and Elizabeth, was reduced into a system by Charles I., and was adopted by him as one of the modes of raising money without resorting to a parliament. The manner in which this ancient prerogative was abused led to its total abolition. By 16 & 17 Car. I. c. 20, it is enacted that none shall be compelled, by writ or otherwise, to take upon him the order of knighthood, and that all proceedings concerning the same shall be void.

Knighthood in England is now conferred by the crown by simple verbal declaration, attended with a slight form, without any patent or other written instrument. Sometimes, but rarely, knighthood is conferred on persons who do not come into the presence of royalty. This is occasionally done to governors of colonies, and other persons in high stations abroad. The lord-lieutenant of Ireland has a delegated authority of conferring this honour.

Knighthood gives precedence over esquires and other untitled gentlemen. 'Sir' is prefixed to the baptismal name of knights and baronets, and their wives have the legal designation of 'Dame,' which is ordinarily converted into 'Lady.'

Besides those who are simply knights, there are knights who are members of particular orders of

classes. These orders exist in most of the kingdoms of Europe, and have had generally for their founder a sovereign prince. The three British orders, the Garter, the Thistle, and St. Patrick, belong to this class. [GARTER, ORDER OF.]

The order of the Thistle was instituted in 1540, by James the Fifth, king of Scotland; but it fell into decay, till in the reign of Queen Anne, 1703, it was revived. The number of knights was limited to thirteen, but in 1827 the number was increased to sixteen, all of whom are nobility of Scotland.

The order of St. Patrick was instituted in 1783. The knights were fifteen, increased in 1833 to twenty-two, who are peers of Ireland.

The order of the Bath differs in some respects from those just spoken of. [BATH, KNIGHTS OF.]

There are also knights of the Guelphic order, and knights of the Ionian order of St. Michael and St. George.

KNIGHT OF THE SHIRE is the designation given to the representative in parliament of English counties at large, as distinguished from such cities and towns as are counties of themselves (which are seldom, if ever, called shires), and the representatives of which, as well as the members for other cities and towns, are denominated citizens or burgesses. The wages payable to knights of the shire for their attendance in parliament, including a reasonable time for their going up and coming down, were four shillings a day, or double what was received by citizens and burgesses. At the close of every session of parliament, the king, in dismissing them to their homes, informed them that they might sue out writs for their wages, upon which each knight separately obtained a writ out of Chancery directed to the sheriff, mentioning the number of days and the sum to be paid, and commanding the sheriff to levy the amount. Upon this the sheriff, in a public county court, divided the burthen among the different hundreds and townships, and issued process to levy the amount, which, to the extent of the money levied, he paid over to the knight. Knights of the shire, and also their electors, were formerly required to be persons either resident or having a household in the county. This regulation, though confirmed by several statutes, had fallen into neglect, and was formally repealed in both its branches by 14 George III. c. 58. The removal of the latter part of the restriction has greatly added to the expense of county elections; and though the Reform Act, 2 Will. IV., c 45, disfranchises out-voters in boroughs, it does not restore the old law as to non-resident county electors. (*Rot. Parl.*, vol. ii. 258, 287; iii. 25, 44, 53, 64, 212; iv. 352.)

KNIGHT'S FEE. [FEUDAL SYSTEM.]

KNIGHTS SERVICE, TENURE BY, otherwise called Tenure in Chivalry, or per Servitium Militare, was, from the times immediately succeeding the Norman Conquest in the eleventh century to the period of the civil war in the seventeenth, considered the first and the most important, as it was also the most general, mode of holding land in England. The land held by this species of tenure was said to consist of so many knights' fees, feoda militis, *i. e.* so many portions of land capable of supporting the dignity of a knight. [FEUDAL SYSTEM.] The duty attached to knight service was that of following the lord to the wars, according to certain rules.

Besides the liability to military service, the tenant by Knight's Service was subject to other occasional burdens. The principal of these are the following:—First, *Aids* [AIDS]. Secondly, *Reliefs*. Thirdly, *Primer Seisin*. Fourthly, *Wardship*. Fifthly, *Marriage*. Sixthly, *Fines upon Alienation*.

This system fell to the ground during the existence of the Commonwealth; and the abolition of this species of tenure was confirmed upon the Restoration by the 12 Car. II. c. 24, which converted all tenures by knight's service into free and common socage. [SOCAGE.] The statute, after taking away the court of wards and liveries, enumerates wardships, liveries, primer seisins, &c., and sweeps away the whole. But rents certain, heriots, suit of court, and other services incident to common socage and fealty, and also fines for alienation due by the customs of particular manors, are preserved. Reliefs for lands of which the tenure is converted into common socage, are saved in cases where a quit-rent is also payable.

KNIGHT, RICHARD PAYNE, eldest son of the Rev. Thomas Knight, of Wormesley Grange, Herefordshire, was born in 1750. Soon after his father's death, in 1764, he was sent to a grammar-school in the neighbourhood, and at the age of eighteen he commenced the study of Greek. Shortly afterwards he visited Italy. In 1780 he was elected M.P. for Leominster, and in 1784 for Ludlow, for which he continued to sit until the year 1806, when he retired from parliament. In 1814 he was appointed a trustee of the British Museum, as the representative of the Townley family.

Early in his life he commenced the formation of a collection of antiques and other works of art, to which his large fortune enabled him to make constant additions. It consisted principally of ancient bronzes and Greek coins; and it was preserved in his London house in Soho Square, which contained a large room fitted up for the purpose. He bequeathed his collection (the value of which was estimated at 50,000*l*.) to the British Museum. Mr. Knight died in London, June 17th, 1824. His first work was 'An Account of the Remains of the Worship of Priapus lately existing at Isernia, in the kingdom of Naples: to which is added a Discourse on the Worship of Priapus, and its connection with the Mystic Theology of the Ancients,' 4to. 1786. (Distributed by the Dilettanti Society.)

His next work was 'An Analytical Essay on the Greek Alphabet,' 4to., London, 1791. Mr. Knight, in 1794, published the 'Landscape,' a didactic poem in three books, and three other metrical works at subsequent periods of his life, but the character of his mind was not poetical.

In 1805 Mr. Payne Knight published 'An Analytical Enquiry into the Principles of Taste,' 8vo., London, which passed through several editions. Mr. Knight published many other works and articles in various reviews and other periodical

works, but the 'Essay on Taste' is the one on which his reputation will chiefly rest.

KNIGHT, THOMAS ANDREW, brother of Richard Payne Knight, was born in Herefordshire Oct. 10, 1758. He was sent to school at Ludlow, and he graduated at Balliol College, Oxford. He subsequently occupied himself with researches into various points of vegetable and animal physiology. One of the most remarkable of his early investigations was contained in a paper read before the Royal Society in 1795, upon the inheritance of disease among fruit-trees, and upon the propagation of debility by grafting. From that time Mr. Knight was looked up to in this country as a vegetable physiologist of a high order; a character which he ably sustained by various experimental researches into vegetable fecundation, the ascent and descent of sap in trees, the phenomena of germination, the influence of light upon leaves, and a variety of similar subjects. In 1797 he published a small work called 'A Treatise on the Culture of the Apple and Pear, and on the Manufacture of Cider and Perry.' He also communicated numerous papers to the 'Transactions of the Horticultural Society,' in the chair of which he succeeded his friend Sir Joseph Banks. He died in London, May 11, 1838.

KNIGHTON, HENRY, an English historian of the close of the fourteenth and beginning of the fifteenth century, was a canon-regular of Leicester Abbey. His 'Compilatio de Eventibus Angliæ à tempore Regis Edgari usque ad mortem Regis Ricardi Secundi,' was published by Twysden in the 'Decem Scriptores,' fol., London, 1652, col. 2311–2741.

KNOLLER, MARTIN VON, a German painter of the eighteenth century, was born at Steinach in the Tyrol, in 1725. His father appears to have been a poor painter of some sort, and the son had to struggle against the obstacles thrown in his way by poverty, until a painter named Troger saw and admired some of Knoller's productions, and offered to take him with him to Vienna. Young Knoller, then twenty years of age, went with his patron, and in eight years from that time he had not a superior of his own age in the Austrian dominions. Already, in the years 1748–50, he assisted Troger in the frescoes of the cathedral church of Brixen; and in 1753 he obtained the great prize of the Austrian Academy for historical painting. In 1753 Knoller returned to the Tyrol, and in the following year painted in fresco the church of Anrass. In 1755 Knoller visited Rome, and greatly improved his style during the three years he spent in that city. From Rome he was invited to Naples by Count Firmin, the Austrian ambassador at Naples, who employed him much in that city, and in the decoration of his palace at Milan. Knoller visited various places subsequently, and painted a great number of pieces. His principal German works are the frescoes of the convent church of Ettal in the Bavarian Alps; and the seven cupolas of the church of Neresheim in Würtemberg, painted in 1770–75, for which he received 22,000 florins. At Vienna he was ennobled with the title of *von* by Maria Theresa. The church of his native place, Steinach, possesses three altar-pieces by Knoller. He died in 1804.

KNOWLTO'NIA, a genus of plants belonging to the natural order *Ranunculaceæ*. The species are one-seeded perennial herbs, with greenish yellow flowers. *K. vesicatoria* is a plant the leaves of which are used as vesicants at the Cape of Good Hope. There are four other species, natives of the Cape of Good Hope, where these plants grow in abundance.

KNOX, JOHN, was born in 1505; his birthplace was probably the village of Gifford in East Lothian. In his youth he was put to the grammar-school at Haddington, and about 1524 removed to the University of St. Andrews. He was ordained a priest before he had attained his 25th year, the canonical age for receiving ordination. It was about the year 1535 that his secession from Roman Catholic doctrines and discipline commenced, but he did not declare himself a Protestant until 1542, when he was condemned as a heretic, degraded from the priesthood, and it is said by Beza that Beaton employed assassins to waylay him. He now became tutor to the sons of Hugh Douglas of Langniddrie, a gentleman of East Lothian, who had embraced the Reformed doctrines; and eventually, yielding to the solicitations of his friends, he became a public preacher of those doctrines.

The murder of Cardinal Beaton had created great excitement through the kingdom. The conspirators had fortified St. Andrews, but the French fleet which came to the assistance of Arran, in June 1547, compelled them to capitulate. Knox, among many others, was taken prisoner, and conveyed to Rouen, where he was confined on board the galleys. He was liberated in 1549, when he repaired to England, and, though he had never received ordination as a Protestant, Cranmer did not hesitate to send him from London to preach in Berwick. In Berwick and the north of England he followed his arduous undertaking of conversion until 1551, when he was made one of King Edward's chaplains, with a salary of 40*l.* a year. He was in London at the time of Edward's death, but thought it prudent to fly the kingdom. He soon retired again to Scotland, where he zealously promulgated his doctrines. The English congregation at Geneva having appointed him their preacher, he made another journey to the Continent (1556), which he quitted finally in 1559. During these, the quietest years of his life, he published 'The First Blast of the Trumpet against the monstrous Regiment of Women,' in which he vehemently attacked the admission of females to the government of nations.

The Protestants in Scotland were by this time nearly equal to the Roman Catholics, both in power and in number; but their condition had lately been changed somewhat for the worse. The queen regent, Mary of Guise, had become their opponent, and many of the preachers were summoned to take their trial. It was on a day not long previous to these trials that Knox returned to his country to resume the labours of his ministry. He hurried instantly to Perth. While

their minds were in that ferment which the queen's perfidiousness (she had broken a promise to stop the trial) and their own danger occasioned, he mounted the pulpit, and by a vehement harangue against idolatry inflamed the multitude with the utmost rage. The indiscretion of a priest, who, immediately after Knox's sermon, was preparing to celebrate mass, caused a violent tumult. The churches in the city were broken open, altars were overturned, pictures defaced, images destroyed, and the monasteries levelled with the ground. The queen regent sent troops to quell this rebellion; troops were also raised by the Protestants, but a treaty was entered into before any blood was shed.

The promotion of the Reformation in his own country was now Knox's sole object. He was reinstated in his pulpit at St. Andrews, and preached there in his usual rough, vehement, zealous, and powerful manner, until the Lords of the Congregation took possession of Edinburgh, where he was immediately chosen minister. In 1560, the queen regent died, and in the following year Queen Mary took possession of the throne of Scotland. At her instigation Knox was accused of treason, and was tried, but pronounced not guilty of any breach of the laws (1563).

Knox continued his exertions, with difficulties of different kinds constantly besetting him. His health also was affected by continual exertion: in 1570 he was struck with apoplexy. In 1572 his exhausted constitution gave way, and he died Nov. 24, 1572. He was buried in Edinburgh, in the church then called St. Giles's, now the Old Church. Knox was twice married.

KNOX, REV. VICESIMUS, D.D., was born at Newington Green, Middlesex, Dec. 8, 1752. His father was the Rev. Vicesimus Knox, Fellow of St. John's College, Oxford, and head-master of Merchant Taylors' School, London. Vicesimus Knox, the son, was also educated at St. John's College, Oxford, where he took the degree of B.A., and was elected to a fellowship. In 1778 he was elected master of Tunbridge School, Kent. After having been master of Tunbridge School thirty-three years, he retired, and was succeeded by his eldest son. He was rector of Rumwell and Ramsden Crays, in Essex, and minister of the chapelry of Shipbourne, in Kent. He performed the duties of a parish priest nearly forty years with great regularity. In the latter part of his life he resided in London. He was much admired as a preacher, and frequently gave his aid in behalf of public charities by delivering a sermon. He died while on a visit to his son at Tunbridge, Sept. 6, 1821.

Dr. Knox's chief work was 'Essays, Moral and Literary,' 12mo., 1777, which came out anonymously, and met with so much success that he republished them in 1778, with additional essays, in 2 vols. 12mo.; many editions have been since published. He published some sermons and other works. The 'Elegant Extracts in Prose,' 'Elegant Extracts in Verse,' and 'Elegant Epistles,' were once popular, but have now been superseded by better and more varied selections.

KNUTSFORD. [CHESHIRE.]

KOBELL, the name of several painters, of whom the two following are the most distinguished:—

Ferdinand Kobell was born at Mannheim in 1740. He very early evinced an invincible passion for landscape painting, which the encouragement of the elector palatine, Karl Theodor, enabled him finally to follow. He studied eighteen months at Paris, in 1768–70, at the expense of the elector, who appointed him his cabinet painter after his return to Mannheim. In 1793 he removed to Munich, where he died in 1799. Kobell was also a very able etcher: a set of his prints, 179 in number, was published in Nürnberg in 1809. Kobell's landscapes are well selected, true in colouring, and executed with care: the figures in them were painted by himself.

Franz Kobell, the younger brother of Ferdinand, was born at Mannheim in 1749. The elector, Karl Theodor, befriended him also, and enabled him, in 1776, to visit Italy, where he remained, chiefly at Rome, for nine years. Franz Kobell, though he executed a few pictures in oil, was scarcely a painter, literally, for his works are almost exclusively drawings, chiefly with the pen, and tinted with sepia. The great bulk of his drawings, said to exceed 10,000, are in three collections—that of the Duke Albert of Sachsen-Teschen in Vienna, that of H. von Rigal in Paris, and that of Baron Stengel in Munich. He died at Munich in 1822.

KOBRE'SIA, a genus of plants belonging to the natural order *Cyperaceæ*. There is only one species of this genus, *K. caricina*, which is found throughout Europe, and in Great Britain on moors in Yorkshire, Durham, and Perthshire.

KOCH, JOSEPH ANTON, a German landscape painter, was born at Obergiebln am Bach, in the valley of the Lech, in the south of Germany, in 1768. Bishop Umgelder, vicar-general of Augsburg, placed Koch with a painter in that city and provided for his maintenance, and afterwards sent him to the Carls-Academie at Stuttgardt, where he remained seven years. Koch tried his fortune in Rome at an early date, and met with complete success; he married a native of Rome and settled himself fixedly in Rome, where he enjoyed a great reputation for half a century. He died at Rome, January 12, 1839.

Koch is likewise known for some clever illustrations to Dante. Among his pictures not exclusively landscapes, are, Noah's Sacrifice, the Emancipation of the Tyrol by Hofer, the Flight of Laban, the fresco illustrations to Dante in the Villa Massimi, besides some others. Koch was also an etcher of considerable skill, and among his works in this class are 24 designs from the ancient fable of the Argonautic expedition, after Carstens.

KOELE'RIA, a genus of plants belonging to the natural order *Gramineæ*. There is only one British species of this genus, *K. cristata*.

KOETHEN. [ANHALT.]

KOLA. [ARCHANGEL.]

KOLLIN. [COLLIN.]

KOLSTSCHA. [HUNGARY.]

KONG MOUNTAINS. Between 9° and 10° N. lat. and 9° and 10° W. long. there exists

high table-land, or perhaps mountain knot, in which the Joliba, Quorra, or Niger, the Gambia, the Rokelle, and the upper feeders of the Senegal take their rise. From this same plateau one mountain range runs N.E., forming the watershed between the basins of the Niger and the Senegal; another takes a north-western direction, dividing the feeders of the Senegal from those of the Gambia; while a third range runs nearly E. along the parallel of 9° N. lat., to the northward of the territories of the Mandingoes, the Foolahs, and the Ashantees. To this last range the name of the Kong Mountains has been given, from the word *kong*, which in the dialect of the Mandingoes is said by Park to mean a mountain. In the kingdom of Yarriba the range is said to turn S.E., and to terminate on the banks of the Niger, near the confluence of the Tchadda with that river. But of this range, if it forms one continuous mass, very little is known. Nothing definite has been ascertained regarding its length, width, or height. [SENEGAMBIA.] (Mungo Park; Mollien; Clapperton; Lander; and Caillié's *Travels in Africa*.)

KONIGA, a genus of plants belonging to the natural order *Cruciferæ*. It is the *Lobularia* of Koch, and the *Glyce* of Lindley. The flowers are white and sweet-scented.

KÖNIGSBERG. [BRANDENBURG.]

KÖNIGSBERG, one of the two governments into which the province of East Prussia is divided, extends along the Baltic from the Gulf of Danzig to the frontiers of Russia, and is bounded S. by the government of Gumbinnen and by Polish Prussia. The area is 8636 square miles, and the population in 1847 was 847,952. The coast is low and indented by two extensive shallow fresh-water bays, which communicate with the Baltic each by a narrow strait towards its eastern extremity. One of these is called the Curische-Haff. [CURISCHE-HAFF.] The other, called the Frische-Haff, extends for 57 miles in a south-west direction from Königsberg, with an average breadth of 11 miles. The Gatt, or strait, by which it joins the Gulf of Danzig at Pillau, has 12 feet depth of water, and is in breadth 3000 feet. In all the rest of its length it is separated from the Baltic by the Frische-Nehrung, a narrow tongue of land, consisting chiefly of sand-banks. The water in the Haff is shallow, especially in summer, so that no large vessels can navigate it. Several arms of the Vistula, the Passarge, which is navigable, and many other rivers, fall into the Frische-Haff. [DANZIG.] The surface of the government is a flat agricultural country, with some extensive forests. Wheat, rye, flax, hemp, &c., are the chief products. Cattle and sheep are numerous.

The chief town of the government of Königsberg is KÖNIGSBERG. *Memel*, the most northern town in Prussia, is situated at the mouth of the Dange, and on the eastern side of the strait that joins the Curische-Haff to the Baltic. It is well built, and has a safe harbour defended by a citadel. The entrance to the harbour is crossed by a bar, on which there is from 13 to 18 feet water. The town is well situated for commerce: the exports consist of timber, hemp, flax, corn, hides, tallow, bristles, &c., most of which are brought from Poland and Russia; the imports are chiefly salt, colonial produce, and manufactured goods. The number of ships that frequent the port amounts to between 700 and 800. There is a light-house in front of the harbour, and in the town there are several breweries, distilleries, soap factories, oil and saw-mills, &c. The population is 9034. *Braunsberg*, a busy commercial town on the Passarge, and near the entrance of that river into the Frische-Haff, has a population of 7746, who manufacture cloth, leather, and yarn, and export corn and timber.

The other government of East Prussia, *Gumbinnen*, lies S.E. and S. of the government of Königsberg. It has an area of 6310 square miles, and its population in 1847 was 632,366. The surface of Gumbinnen, like that of Königsberg, is flat, except in the south, where a large portion of the surface is hilly, and abounds with lakes. The produce is similar to that of the government of Königsberg. The largest horses in Prussia are bred in the government of Gumbinnen. The chief rivers are the Memel [NIEMEN], which passes Tilsit, and flows by several arms into the Curische-Haff; and the Pregel, which flows due west, and falls into the Frische-Haff below Königsberg. [PRUSSIA, EAST.]

In the government of Gumbinnen the most important town, *Tilsit*, is situated on the left bank of the Memel, at the point where the Tilse falls into that river. It is a pretty, well-built town, and contains 5 churches, a fine town-hall, a gymnasium, very extensive barracks, 2 hospitals, and 17,179 inhabitants, including the garrison. The townspeople trade in corn, linseed, timber, beer, spirits, leather, &c. The town is defended by a strong castle. Tilsit has acquired celebrity by being the place where the famous treaties were concluded between France, and Russia, and Prussia, on the 7th and 9th of July, 1807. *Insterburg*, a town of 8386 inhabitants, stands near the junction of the Pregel and the Inster, on the left bank of the Angerap. It has manufactures of cloth, linen, woollen stockings, and spirits, and trades extensively in corn and flax. *Gumbinnen*, the chief town of the government, stands on the Pissa, a few miles E. of Insterburg, and has 6255 inhabitants. The town is regularly built, and has woollen and linen factories, distilleries, and tanyards; the trade in corn and flax-seed is important.

KÖNIGSBERG, the capital of East Prussia, is situated near the mouth of the Pregel, 78 miles E. by N. from Danzig, in 54° 42′ N. lat., 20° 29′ E. long., and has 68,000 inhabitants. It consists of three parts, called the Old Town, Löbenicht, and the Kneiphof, besides the royal palace and the citadel Friedericksberg, and 14 suburbs. The Old Town and Löbenicht are on the north side of the river; the Kneiphof stands on an island formed by the Pregel. The origin of the city dates from 1254, when the Teutonic Knights built a fortress on the height where the castle now stands. After 1365 it became one of the principal cities of the Hanseatic League; and here, in 1701, Frederick III., of Brandenburg, was crowned the first king of Prussia.

The town is irregularly built; the streets are mean, narrow, and crooked; there are but few handsome edifices. The Pregel is crossed by seven wooden bridges. The most remarkable buildings are the castle or royal palace, and the cathedral, in the library attached to which are several autograph letters of Luther's to Catherine Bora. Among the numerous public institutions is the university, founded in 1544, with which are combined a theological seminary, one Polish, one Lithuanian seminary, a library of 6000 volumes, a botanic garden, and an observatory. There are likewise three gymnasia, and many charitable institutions. Königsberg has communication by the Friedrichs-Gruben Canal with the Memel, by which river, the Oginski Canal, and the Dnieper, it has the advantage of a complete interior navigation into Poland, Lithuania, and even to the Black Sea. The port of Königsberg is Pillau [DANZIG], where vessels that cannot take all their cargo from the warehouses of Königsberg ship the remainder of their freight, which is brought from the Pregel to Pillau in lighters from 20 to 100 tons' burthen. The manufactures consist of woollen cloth, linen, silk, leather, tobacco, sugar, beer, and spirits. The exports are composed of corn, flax-seed, flax, hemp, linen yarn, linen cloth, oil cakes, bristles, feathers, and hides. The imports are chiefly sugar, coffee, spices, dyewoods, tobacco, salt, various raw materials, and manufactured goods.

KOOBA. [GEORGIA.]

KORAN. [MOHAMMED.]

KORAY, ADEIMANTOS, born at Smyrna in 1748, of a family from Chios, studied first at Smyrna, and afterwards at Montpellier, where he took his degree as doctor of medicine, and settled in France. He wrote several works on medicine, and published French translations of the treatise of Hippocrates 'On Air, Water, and Situation,' with copious notes, and of the 'Characters' of Theophrastus. In 1801 he translated into modern Greek Beccaria's treatise 'On Crimes and Punishments.' He afterwards wrote in French a memoir, 'De l'Etat Actuel de la Civilization en Grèce,' 1803. Koray also edited a series of ancient Greek writers, under the title of the 'Hellenic Library.' He contributed to fix the rules and orthography of the modern Greek, and wished to purify the language by discarding its numerous Italianisms, Gallicisms, and Germanisms. Koray died at Paris soon after the successful termination of the struggle of his countrymen for independence.

KORDOFAN, or KORDUFAN, a country lying to the south of Nubia, and west of the Bahr-el-Abiad, which separates it from Sennaar, consists of an assemblage of several small oases, divided from Dar-Fur by vast deserts. The population is composed chiefly of negroes, who devote themselves to agriculture. The rest of the inhabitants are settlers from Dongola, who are merchants, and frequent the caravan routes, and Arabs, who in general wander from place to place in the deserts. Gold-dust and iron-ore are found; the latter is worked. On the oases the principal objects of cultivation are millet, sessamum, and some wheat and barley. The wealth of the Arab tribes consists of their horses, cattle, and camels. The negroes rear great numbers of cattle, sheep, and goats. Among the wild animals are elephants, giraffes, and antelopes. Kordofan, after being for a long time tributary to the King of Sennaar, was taken in the latter half of the 18th century by the King of Dar-Fur, in whose possession it remained till 1820, when it was conquered by Mehemet Ali, pasha of Egypt, of which country it now forms a dependency. Obeid, formerly a considerable town, was, on the occupation of the Egyptian Turks, destroyed, and the population now resident on its site does not exceed 5000.

KÖRNER, THEODOR, was born at Dresden in the year 1791, of respectable parents. The weakness of his health prevented any great application to study; but as he grew, both his mind and body gained strength, and he showed an early inclination to history, mathematics, and physical science. He went to the universities of Leipzig, Berlin, and Vienna, where he laboured much at poetical composition. Two pieces, 'Die Braut' (The Bride), and 'Der grüne Domino' (The Green Domino), were acted at Vienna in 1812, and meeting with success were followed by others, of which 'Zriny' and 'Rosamunde' (the English Fair Rosamond), two tragedies, were works aiming at a high character.

The events of the year 1813 made a deep impression on Körner. Inspired by patriotic zeal he joined a volunteer corps in the cause of Prussia against the French. He was wounded by two sabre cuts at the battle of Kitzen, and in a subsequent battle, Aug. 25, he was killed by a shot, and buried by his comrades at the foot of an oak on the road from Lübelow to Dreikrug.

As Körner was scarcely twenty-two years of age at the time of his death, his works, which are rather numerous, must be judged with lenity. His fame chiefly rests on a collection of lyrical pieces called 'Leier und Schwert' (Lyre and Sword), many of which were written in the camp. His happiest effort of imagination is the 'Schwert-Lied' (Sword-Song), in which the sword becomes a person and addresses its owner,—a piece which has been translated (not very closely) by Lord F. L. Gower.

A complete edition of his works, in one volume, was published at Berlin in 1835.

KOSCIUSKO, THADDEUS, born in 1756, of a noble family of Lithuania, after studying at Warsaw and Paris, was made a captain in the Polish army. He afterwards accompanied La Fayette to assist the revolted American colonies against England. He obtained the rank of general officer in the American army, with a pension. In 1789 he was made major-general in the Polish army. He served with distinction in 179[illegible] against the Russians, but, King Stanislaus having submitted to the empress, and Poland being occupied by Russian troops, Kosciusko with several other officers left the service, and withdrew to Germany. When the revolution broke out in Poland at the beginning of 1794, Kosciusko was put at the head of the national forces. After some temporary successes he was overpowered by superior numbers at the battle of Macziewice (Oct. 10, 1794), and taken prisoner. He was

conveyed to St. Petersburg; but, being released by the Emperor Paul, he repaired to America, and returned to France about 1798, where he refused all offers of employment from Napoleon, and exerted himself to procure an extension of the new kingdom of Poland, founded in 1815.

In 1816 Kosciusko settled at Soleure, in Switzerland, where he applied himself to agricultural pursuits. He died in October 1817, in consequence of a fall from his horse. His remains were removed to Cracow, and placed in the vaults of the kings of Poland.

KOSTROMA. [Costroma.]

KOTTBUS. [Brandenburg.]

KOTZEBUE, AUGUST FRIEDRICH FERDINAND VON, was born at Weimar in 1761. He studied at the gymnasium of that town, and also at the university of Jena. His poetical and dramatic tastes had manifested themselves at an early age. He studied the law, but at the same time composed slight theatrical pieces. In 1781 he went to St. Petersburg, and was kindly received by the Emperor of Russia, who raised him to the rank of nobility, and made him president of the government of Esthonia. While at Reval, he wrote several favourite works, and among them 'Menschenhass und Reue' (Misanthropy and Repentance), well known in this country under the title of 'The Stranger.' He travelled in 1790 to Pyrmont, visited Paris, and returned to Esthonia in 1795, where he wrote above twenty dramas. In 1798 he went to Vienna as poet to the Court Theatre, but gave up that place in two years, and received a yearly pension of 1000 crowns. He returned to Russia, where he had scarcely arrived when he was arrested and sent to Siberia. A translation made by a young Russian of a paltry little piece by Kotzebue, called 'Der Leibkutscher Peters des Grossen' (The Body-Coachman of Peter the Great), so delighted the Emperor Paul that he was recalled from banishment. After the death of this emperor he went to Weimar, and thence to Jena. Some disagreement with Göthe caused him to remove to Berlin, where he edited one or two periodical works. His 'Recollections' of Paris, of Rome, and of Naples, and his 'Early History of Prussia' appear to have added little to his reputation. The events of 1806 caused him to fly from Prussia to Russia, where in his writings he unceasingly attacked the Emperor Napoleon and the French. In 1814 he went as Russian consul-general to Königsberg, where he wrote several little plays, and an indifferent history of Germany. In 1817, after having again visited St. Petersburg, he was despatched to Germany by the Emperor of Russia (Alexander), with a large salary, to watch the state of literature and public opinion, and to communicate all that he could learn. He edited a weekly literary paper; but the German people became disgusted with his scoffing at everything like liberal opinions, and his conduct particularly roused the indignation of Sand, a student and political enthusiast, who, considering him an enemy to liberty, assassinated him in 1819.

Kotzebue's fame rests almost entirely on his dramas, which are nearly 100 in number, and of the most various degrees of merit. Many of them have been translated into English. We need only mention 'The Stranger,' 'Lovers' Vows' (Der Strassenraüber aus Kindersliebe), and 'Pizarro' (Die Spanier in Peru).

KOTZEBUE, OTTO VON, captain in the Russian marines, was son of the above. In 1814 he set out on a voyage round the world, which he completed in 1818, and of which he published an account. He had previously gone round the world as a midshipman under Krusenstern. In 1824 he undertook a third voyage as captain of an imperial man-of-war, when he discovered two islands in the South Sea, and returned in 1826. An account of this voyage was published in London, by Kotzebue's companion, Dr. Eschholz, and by himself in St. Petersburg.

KOULI KHAN. [Nadir Shah.]

KRAFFT, ADAM, a sculptor and architect of Nürnberg, was born about 1435. There are several of his performances still extant in the city and churches of Nürnberg, but the principal is the remarkable tabernacle in stone, affixed against one of the columns of the choir of the church of St. Lawrence (Lorenzkirche). There is a print of this tabernacle in Doppelmayr's work on the artists of Nürnberg. He is supposed to have died in the hospital of Schwabach in 1507.

KRAKOW, Russian Province. [Poland.]

KRAKOW. [Cracow.]

KRAMERIA'CEÆ, a small natural order of polypetalous exogenous plants, by most botanists referred to *Polygalaceæ*, but apparently distinct. *Krameria triandria*, or *Rhatany*, is a small low-lying undershrub, growing on the dry projecting parts of the mountains of Peru near Huanaco, &c. The root is heavy, and devoid of odour; but the taste, especially of the bark, is strongly astringent and bitter, yet not disagreeable. Iodine turns it black. According to the analysis of Gmelin, it contains much tannin, with saccharine and mucilaginous matter, woody fibre, and salts.

KRANTZ, ALBERT, was born at Hamburg about the middle of the 15th century, and died there in 1517. He was rector of Rostock university in 1482, syndic of Hamburg in 1489, and was sent by the Confederation of the Hanseatic Towns on several missions to France and England. He is the author of several works:—1, 'Chronica Regnorum Aquilonarium, Daniæ, Sueciæ, et Norvegiæ,' 1546; 2, 'Saxonia, sive de Saxoniæ Gentis vetusta Origine, libri xii.,' 1520; 3, 'Wandalia, sive Historia de Wandalorum vera Origine, libri xiv.,' 1519; 4, 'Historia Ecclesiastica Saxoniæ,' 1548.

KREASOTE. [Creasote.]

KREUTZ. [Croatia.]

KRISHNA. [Vishnu.]

KRUMAN. [Betchouana.]

KSHATRIYAS. [Hindustan.]

KUBAN, or KOOBAN, a Russian river that rises in Mount Elbrouz, the highest peak of the Caucasian Mountains, and flows in a general N.W. direction between high mountain ranges, from which it receives numerous feeders, until it reaches the level country E. of the Sea of Azof. It here turns westward, and continues in that direction for the

rest of its course. Towards its mouth it enters a low flat country, and along its banks salt-marshes extend to a considerable distance. In this plain the river divides into two branches, and forms the Island of Taman. One arm of this river falls into the Sea of Azof; the other falls into the Kubanskoi Liman, or Lake of Kuban, which is united by a narrow passage to the Black Sea. The Kuban is above 400 miles in length, and generally runs with a rapid current. It is navigable for barges up to Yekaterinodar.

KÜGELGEN, GERHARD and CARL VON, twin brothers and distinguished painters, were born at Bacharach on the Rhine, in 1772. Gerhard painted history and portrait; and Carl, landscape. Gerhard was induced to try his fortune at St. Petersburg, whither he was soon followed by his brother Carl. They both met with great success; but Gerhard removed in 1804 to Dresden. Carl remained at St. Petersburg, where he was appointed court painter. Gerhard had established a high reputation at Dresden, when he was brutally robbed and murdered in 1820.

Carl Kügelgen painted many landscapes, and executed many drawings of the scenery of Russia, both in the northern and southern provinces. He made two journeys in the Crimea, in 1804 and 1806, for the express purpose of painting its scenery. In 1818 he went for a similar purpose into Finland. Most of the paintings and drawings made on these journeys were purchased by the emperors Paul and Alexander. Kügelgen executed in all 171 pictures and 290 finished drawings. He died at Reval in 1832.

KUMAON, a district forming part of the British territory in Northern Hindustan, comprehending an area of about 7000 square miles, includes the country between the sources of the Ganges and the river Kalee, extending as far south as 29° 20′ N. lat. The whole of this district presents a succession of mountainous ridges, increasing in elevation as they approach the north, until they reach the snowy peaks of the Himalayas. Towards the south the country presents an almost uninterrupted succession of forests, containing many large trees; but in the higher region to the north, where the height amounts to 2500 feet above the plains, tropical productions disappear, there are no longer forests of any description, but in their place numerous groups of trees of various kinds commonly found in Europe; among these are the oak, fir, willow, mulberry, and birch. Kumaon is very thinly inhabited, and by a race who do not partake of the hardy character usually shown by the natives of so cold a region. The country was acquired by the British in 1815, to whom it offers little advantage, except from its climate, which is found to be almost as efficient in restoring its tone to the constitution of Europeans as a visit to Europe. For this purpose the capital, Almora, is much frequented. [ALMORA.]

KUNDÜZ. [TURKISTAN.]

KUPETZKY, JOHANN, a portrait painter, was born at Bösing or Bozin, near Presburg, in Hungary, in 1666 or 1667. His father was a weaver. Young Kupetzky fled from home when only fifteen years of age, begged his way to Switzerland, and there, at Lucerne, obtained admission into the house of a painter of the name of Klaus, who instructed him in painting. Kupetzky, after a time, found his way to Rome, and after a stay of twenty-two years in Italy he was invited by the Prince Adam von Lichtenstein to Vienna, where he soon obtained the reputation of the first portrait painter of his time. He numbered among his patrons and admirers the emperors Joseph I. and Charles VI., and the Prince Eugene, and in 1716 he was invited by Peter the Great to Carlsbad. Peter wished Kupetzky to enter his service, and to return with him to St. Petersburg, but Kupetzky declined. He finally left Vienna, and settled in Nürnberg, where he died in 1740.

KUR. [ARAS; GEORGIA.]

KURDISTAN. [PERSIA.]

KURDISTAN (the country of the Kurds) comprehends the larger portion of that mountain region which divides the elevated table-land of Iran (Persia) from the low plains of Mesopotamia or Al-Jezireh. As it does not constitute a political division, its boundaries are not exactly determined; but the latitudes vary between 34° and 38° N., while the width of this mountain region may be about a hundred miles. About three-fourths are under the dominion of the Turkish sultan. The remainder belongs to Persia.

The higher mountain region occupies the northern portion, and extends from the Erdesh Tagh to a range which on the west approaches the banks of the Tigris south of Jezireh-ibn-Omar; from which point it extends in an east by south direction across the whole region, being overtopped near the boundary-line of Persia by the elevated peak of Rowandiz (10,120 feet above the sea-level). In the vicinity of its northern limits the rocky masses are rarely and not deeply furrowed by depressions in the shape of valleys. They form a table-land, from 6000 to 7000 feet above the sea-level, whose surface presents a succession of low hills, with gentle declivities and small plains between them. In proceeding southward the country gradually changes its features. The valleys sink deeper, and the masses between them rise higher, and thus the table-land is changed into a mountainous country, consisting of high ridges with steep acclivities and comparatively narrow valleys between them. Some of the ridges are 13,000 feet high; and their declivities and the valleys present a vigorous vegetation in the numerous forests, and in the growth of the different kinds of grain and vegetables which are cultivated. The region is (really though not nominally) possessed by tribes of Kurds. Probably more than half the population are Mohammedans, and the other half Christians, among whom the Nestorians are the most numerous. Near the southern extremity of this region are the towns of Amadiyah and Rowandiz, the former of which contains about 200 houses, and the latter 1000.

The southern portion of Kurdistan, or that which lies between 36° and 34° N. lat., is most mountainous in its eastern districts, contiguous to the table-land of Iran. The surface to the west is however diversified by several ranges of hills

Three such ranges extend from the banks of the Tigris to the eastern mountains.

The largest river of Kurdistan is the Zab Ala, or Great Zab. It rises within the boundary of Persia, at an elevation of about 7000 feet above the sea-level, receives by its numerous affluents the drainage of almost the whole of Northern Kurdistan, enters Southern Kurdistan by a narrow glen, and joins the Tigris about 30 miles below Mosul. At the place of their confluence the rivers are nearly equal in size. The other large rivers of Kurdistan are the Zab Asfal, or Lesser Zab, and the Diyálah. They rise in the elevated region dividing Southern Kurdistan from the table-land of Iran, and, after draining the first-mentioned country, they fall into the Tigris.

Among the towns of Southern Kurdistan is Arbil, which contains 6000 people, three large mosques, and two baths. Altún Kupri, on the banks of the Lesser Zab, contains 8000 inhabitants. Kerkuk has 10,000 inhabitants, a few manufactories, and a considerable commerce. Suleimaniyah, the modern capital of Southern Kurdistan, and the residence of the hereditary pasha or wali, was built in 1788, and contains more than 2000 houses and about 10,000 inhabitants, six caravanserais, several baths, and five mosques. The commerce with the adjacent countries is considerable, and is concentrated in this place.

Little is known of the climate of Kurdistan, except that of Suleimaniyah, where the winters are very cold and the summers very hot.

The fields of Kurdistan produce wheat, barley, and Indian corn; millet and rice are grown only in the lower districts towards the banks of the Tigris. Tobacco and cotton are largely cultivated, and supply articles of commerce. Fruits of various kinds are cultivated.

Sheep, cattle, and horses abound; but the best horses are imported from Bagdad. There are bears, wild hogs, wild goats, antelopes, jackals, and land-turtles. Bees are abundant.

Minerals appear to be scarce, except building-stone. In the mountain region iron and sulphur are met with. There are several salt-springs, and also springs which yield naphtha and petroleum.

As the passes through the ranges of mountains and hills are difficult, and single travellers are subject to be robbed and murdered, commerce is carried on by caravans. At least one caravan departs every month from Suleimaniyah for the Persian towns of Tabriz and Hamadan. There are other caravans to Hamadan for goods from Bagdad, to Mosul for goods from Damascus, and to Erzerum for goods from the Black Sea.

The population of Turkish Kurdistan is estimated at about one million, of which four-fifths are Kurds, and the remainder Armenians, Persians, Jews, and Turks. The Kurdish population of Persian Kurdistan may amount to 20,000 individuals. But the Kurds in tribes extend into other countries, and are believed in the aggregate to amount to about two millions. They are a stout race of men, of dark complexion, with black hair, a large mouth, small eyes, and a savage look. Their language is derived from the same stock as that of the modern Persian; but, not having been fixed by writing, it has degenerated, and is divided into many dialects. In Turkish Kurdistan the nation is composed of two castes, the warriors, and the working people or agriculturists. The Kurds are Mohammedans.

The Kurds were known to the ancients. When subject to the kings of ancient Persia, they belonged partly to the province of Assyria, and partly to Media. After the time of Alexander their country was united to the kingdom of Syria, but was dismembered from it in the third century before Christ by the Parthians. It afterwards became a part of the new Persian empire, and fell with it under the dominion of the caliphs of Bagdad. After the destruction of the caliphat, Kurdistan partook of the numerous revolutions in Persia and Mesopotamia. The famous sultan Saladin was a Kurd, and appears to have got possession at least of a part of the country. But it soon passed under the dominion of the Mongols (1258), and finally (1388) was conquered by Timur. After the establishment of the Sooffee dynasty (1502), Kurdistan constituted a part of Persia, and remained so till the seventeenth century, when the Kurds, oppressed by the Persians, revolted, and subjected themselves to the dominion of the Turkish emperor.

(Rich, *Narrative of a Residence in Kurdistan;* Ainsworth and Sheil, in *London Geogr. Journal;* Ainsworth, *Travels and Researches in Asia Minor*, &c.; Rawlinson, *Journey from Tabriz through Persian Kurdistan*, &c.)

KURILE ISLES, a series of 25 islands extending between Kamtchatka and the Japanese island of Jeso. They are all of volcanic origin, consisting of high masses of lava. Ten active volcanoes are known to exist on the nineteen northern islands. The vegetation is scanty, and on those near Kamtchatka trees do not grow; but the southern islands are more fertile, especially Kunashir and Iturup, on which the Japanese have settled. The remainder are claimed by the Russians. Beavers are said to abound in these islands.

KURLAND. [COURLAND.]

KURRICHANE. [BETCHOUANA.]

KURSK, or KOURSK, a government of European Russia, lying between 50° 10′ and 52° 26′ N. lat., 33° 40′ and 38° 20′ E. long., is bounded N. by Orel, E. by Voronetz, S. and W. by the Ukraine and Tschernigov. Its area is 17,318 square miles, and the population in 1846 was 1,680,000. The surface of the province is undulating. It contains no mountains, but is traversed by many small eminences. There are no navigable rivers or large lakes, nor are the forests extensive. The east and south parts of the government belong to the basin of the Don, and are drained by numerous small streams that fall into the Donetz; the western and northern parts are drained by the rivers that form the Seim, a feeder of the Desna, which falls into the Dnieper. Kursk is one of the most fertile provinces of the empire; the soil is so rich that it needs no manure. The system of agriculture is very rude. The chief products are rye, wheat, barley, oats, peas, buck-

wheat, millet, poppy, hemp, hops, tobacco, and flax. Corn, of which there is always a large surplus for exportation, is sometimes kept in caves or pits for 5, 6, or even 10 years. Horticulture is very general and successful; apples, cherries, plums, pears, hazel-nuts, and melons are grown. Fuel is scarce; straw and dried cowdung are used as substitutes for firewood. The breeding of oxen, horses, and sheep is carried on very extensively. The inhabitants keep great numbers of swine, domestic poultry, and bees. The minerals are iron, limestone, flints, and saltpetre. The manufactures are unimportant, consisting only of such articles as each family in most instances makes for itself. The exports consist of the natural productions of the country. The mode of transport in the absence of water-ways is expensive; corn and other articles of export are mostly sent by land to the Volga and thence to St. Petersburg; sometimes they are conveyed to the Desna, and down that river to Odessa.

Koursk, the capital of the government, a town of 25,000 inhabitants, situated on the Tuskara, in 51° 43′ 30″ N. lat., 36° 27′ 45″ E. long., is the residence of the military governor of Koursk and Orel, and of the Archbishop of Koursk and Belgorod. The town is surrounded with palisades, the old ramparts having been converted into walks and gardens. The streets are narrow and crooked. There are 16 churches, 2 convents, an ecclesiastical seminary, a gymnasium, hospital, and several manufactories. The other towns are—BELGOROD: *Karotcha*, on the left bank of a river of the same name in the south of the province, which has 6 churches, saltpetre factories, and 11,000 inhabitants: *Putiwl*, on the Seim, in the west of the province; population, 10,000: *Sudscha*, 50 miles S.W. from Koursk; population, 7000: *Rylsk*, W. of Koursk, on the Seim; *Staroi-Oskol*, in the east of the province, on the Oskol, a feeder of the Donetz; *Mikhailovka* in the south-east; and *Obojan* in the interior, S. of Koursk, each of which has over 6000 inhabitants.

KUSTER, LUDOLF, was born in 1670 at Blomberg in Westphalia, and studied at Berlin. Kuster went afterwards to Utrecht, where he contributed several papers to the 'Thesaurus Antiquitatum Romanarum' of Grævius, and to the 'Thesaurus Antiquitatum Græcarum' of James Gronovius. In the year 1700 he repaired to England, where he edited a new edition of Suidas, which was published at Cambridge, 3 vols. fol., 1705. In 1710 he produced an edition of Aristophanes, with the Scholia. About 1713 Kuster, being then at Paris, obtained from Louis XIV. a pension of 2000 livres, and was made a member of the Academy of Inscriptions. He died at Paris in 1716. His notes on Hesychius, which he left in manuscript, were inserted by J. Alberti in his edition of Hesychius, 2 vols. fol., 1746.

KÜSTRIN. [BRANDENBURG.]

KUTCH, or CUTCH. [HINDUSTAN.]

KUTCH GUNDAVA. [BELOOCHISTAN.]

KUYP, or CUYP, ALBERT, the son and disciple of Jacob Gerutze Kuyp, a landscape painter of Dort, was born at Dort in 1606. Though Kuyp is reckoned among the cattle painters, he likewise painted landscapes, properly so called, and sea-pieces. Scarcely anything is known of the circumstances of his life, except that he was a rigid Calvinist, of retired habits, and died about 1672. Kuyp is a great favourite in England, and it is here that his finest works are found. Kuyp has been called the Dutch Claude.

KYD, THOMAS, was one of those dramatic poets who immediately preceded Shakspere. Three plays of his are extant—1, 'Cornelia; or Pompey the Great, his fair Cornelia's Tragedy,' a translation, respectably executed, from the French of Garnier, printed in 4to., 1594, 1595; 2, 'The First Part of Jeronimo,' 1605, 4to.; 3, 'The Spanish Tragedy, or Hieronymo is Mad Again,' of which there are many editions, the oldest known being of 1599, though the play was certainly printed earlier. All the three are in Dodsley's 'Old Plays.'

KY'DIA, a genus of trees of the natural family of *Byttneriaceæ*, which is sometimes called *Sterculiaceæ*. The species are only two, found in the hilly parts of Hindustan, as far as the foot of the Himalaya Mountains. *K. calycina* abounds in a bland mucilage, which is employed in clarifying sugar.

L is a liquid formed at that part of the palate which is near the teeth. It is therefore allied to the adjoining liquids *r* and *n*, and to the palato-dental consonants. The interchanges to which it is liable are as follows:—

1. *L* is interchangeable with *r*. Hence from the Greek or rather Latin *apostolo*, *epistola*, the French have derived *apostre*, *apôtre*; *épistre*, *épître*.

2. *L* with *n*, as *Barcino* (onis), *Barcelona*; *Ruscino*, *Roussillon*; *Bononia*, *Bologna* or *Boulogne*; λιτρον, *nitrum*; *anima* in Lat., Ital. *alma*.

3. *L* with *d*, as *St. Aegidius*, *St. Giles*; *gridiron*, meaning *grill-iron*; and the English title *admiral* is derived from the Spanish *almirante*. [D, No. 4.] *L* is also interchangeable with *t*. [T.]

4. *Ll* in the middle of words with *li*. Examples of this are abundant in the French pronunciation of the *l mouillé*. Hence from the French *billards* is derived without much alteration of sound the English *billiards*. This change prevails between the Greek and Latin languages, as φυλλο and *folio*, a leaf; αλλο and *alio*, other; ἁλλ and *sali*, leap. With these forms may be compared *Mallorca*, pronounced *Mayorca*, the Spanish name for *Majorca*. Lastly, the Portuguese write *lh* with the same sound.

5. *L* disappearing. Not very dissimilar from the preceding section is the Italian interchange of *pl*, *cl*, *fl*, with *pi*, *chi*, *fi*; as from *pleno*, full, *pieno*; *plano*, flat or low, *piano*; *clavi*, a key, *chiave*; *claro*, bright, *chiaro*; *clamare*, to call, *chiamare*; and *flor*, a flower, *fiore*; *Florenza*, once *Fiorenza*, now *Firenze*, the name of Florence.

This loss of an *l* after a consonant appears in other languages. The German *fliehen*, to fly, has for its chief element *flug*, corresponding to the Latin *fug*. In the same language *flispern* and *fispern* both mean to whisper; *flittich* and *fittich* both mean a wing; *blinzen* corresponds to the English words *blink* and wink.

6. *L* with *u*, particularly after an *a*. *Alfidena*, a town, or *Aufidena*; ιλεημοσυνη, pity, Ital. *limosina*, Fr. *aumône*, Eng. *alms*; Lat. *altari*, an altar, Fr. *autel*; Lat. *aliqui-uno*, Ital. *alcuno*, Fr. *aucun*; Lat. *ulna*, Fr. *aune*. The French also contract the pronoun and article *à le*, *à les*, to *au* and *aux*.

7. Many words beginning with an *l* once had other consonants before the *l*: as in Latin, *loco*, a place, *liti*, a suit, *lato*, broad, were once preceded by *st*—thus, *stloco*, *stliti*, *stlato*. This explains how *lato* in Latin is the participle of *toll*. It must once have been *tlato*, corresponding to the Greek forms of the same root, viz. τλη-τος, τλη-μων, as well as τολ-μη.

8. *L* is very apt to appear in a root, sometimes before a vowel, sometimes after one, as in the Greek words καλε or κλη, βαλ or βλη, &c. Where this slipping occurs after a sound like *k*, the *l* is apt to be converted into an *r*. Thus the Greek σκαλευ, poke, is in Latin *scru-tari* (compare the phrase *scrutari* ignem, to poke the fire).

LAALAND. [Denmark.]

LA'BEO (Cuvier), a genus of fishes belonging to the *Cyprinidæ*. The species of this genus resemble the true Carps in having the dorsal fin long, but they do not possess the strong spine of the anal and dorsal fins. The lips are very thick and fleshy, and more or less crenulated. There are no cirri. An illustration of this genus will be found in the *Cyprinus Niloticus* of Geoffroy St. Hilaire. The *Cyprinus fimbriatus* of Bloch and the *Catostomus cyprinus* of Lesueur also belong to the genus *Labeo*, which has no representative in the European seas.

LABEO, QUINTUS ANTISTIUS, a Roman of some distinction as a jurist, was the father of a more distinguished son. He was at the battle of Philippi, on the side of M. Brutus and Cassius, and after the defeat he killed himself in his tent, and was buried there. (Appian, 'Civil Wars,' iv. 135.) Q. Antistius Labeo, the son, was a pupil of C. Trebatius. He lived in the time of Augustus. Labeo was distinguished for his knowledge of Roman law and Roman usages, and also for the freedom with which he expressed his opinions to Augustus. Ateius Capito, his rival in legal knowledge, was raised to the consulship by Augustus in order that he might have that superiority in rank which his talents alone could not give him. Labeo never enjoyed any higher honour than the prætorship. (Tacitus, 'Annal.' iii. 75.) The character of Labeo is given by Gellius (xiii. 10). He was confident in his abilities and acquirements, and bold enough to advance many new opinions. He was a copious writer, and is said to have produced four hundred different treatises, from which there are sixty-three excerpts in the 'Digest,' and he is very often cited by the other jurists.

C. Ateius Capito, the rival of Labeo, founded a sect or school, which was opposed to that of Labeo. Capito was made Consul Suffectus by Augustus, A.U.C. 758; and it was during his term of office that he decided that a patron could not take his freedwoman to wife against her consent,—a decision perfectly consistent with Roman principles. Capito was a flatterer. Instances of Capito's adulation are recorded by Tacitus ('Annal.' iii. 70) and Suetonius. He died in the time of Tiberius, A.D. 22. ('Annal.' iii. 75.)

Capito is often cited by other jurists, Proculus,

Javolenus, Paulus, and once by Labeo: they always call him Ateius. Capito's reputation as a lawyer was very great. There are no excerpts from Capito in the 'Digest.'

From the time of Labeo and Capito we date the formation of two opposed sects or schools of law among the Romans. The nature of this opposition is collected from the words of Pomponius ('Dig.' i. tit. 2). The followers of Labeo were called Proculiani, from Proculus, one of the successors of Labeo. Those who attached themselves to the school of Capito were called Sabiniani, or sometimes Schola Cassiana, from Massurius Sabinus and C. Cassius Longinus.

LABIATÆ. [LAMIACÆ.]

LABIENUS. [CÆSAR.]

LABLAB, a name, it is said, of Egyptian origin, which has been adopted by botanists to designate a genus of *papilionaceous Leguminosæ* of the tribe *Phaseoleæ*.

LABORATORY, the room in which chemical operations are performed. The requisites for the proper arrangement of and the necessary instruments for a laboratory may be seen at length in Professor Faraday's 'Chemical Manipulation.'

LABORDE, JEAN-BENJAMIN, was born in Paris in 1734, of a rich family, and received a liberal education. He became premier valet de chambre to Louis XV., and the favourite and confidant of that prince. He composed several operas, and these, though possessing little merit, proved successful. On the death of Louis, in 1774, M. Laborde married, and became one of the fermiers-généraux. He devoted his spare hours to study, and, in 1780, published his 'Essai sur la Musique Ancienne et Moderne,' in four 4to volumes. The French Revolution brought in its train the ruin of M. Laborde. He perished on the scaffold July 20, 1794, just five days before the fall of Robespierre. He published many other works, one of which was an 'Essai sur l'Histoire Chronologique de plus de 80 Peuples de l'Antiquité,' 2 vols., in 4to.

LABOUR. [WAGES.]

LABOUR. [BASQUES, LE PAYS DES.]

LABRADOR. [HUDSON'S BAY.]

LABRAX (Cuvier), a genus of fishes of the section *Acanthopterygii* and family *Percidæ*. The fishes of this genus are closely allied to the true Perches, but may be distinguished by the opercular bones being covered with scales, the absence of denticulations on the suborbital and interopercular bones, the operculum being terminated by two spines, and likewise by the tongue being almost entirely covered with minute and closely set teeth. There are two dorsal fins.

Examples.—*Labrax Lupus* (the Basse, or Sea Dace), abundant in the Mediterranean; *Labrax lineatus* (the Rock Fish, or Striped Basse of the United States); and a second American species, *Labrax mucronatus*.

LA'BRIDÆ (*Labroïdes*, Cuvier), the family of Wrasses, or Rock Fishes, belonging to the order *Acanthopterygii*. The fishes of this family are of an oblong form, covered with scales, usually of a large size, formed of simple laminæ, and with the external or posterior margin smooth; they have a single dorsal fin supported in front by spinous rays, each of which is generally furnished with a membranous appendage; the jaws are covered by thick fleshy lips; two upper pharyngeals are attached to the cranium, and together with a large lower pharyngeal are armed with teeth which are large and rounded, sometimes pointed or laminated, and generally very strong. The intestinal canal is without cœca, or, when these appendages are present, they are of small size, and there is a simple and strong natatory bladder.

The fishes of this family are generally most beautifully coloured; they frequent rocky places, spawning in spring or summer. Their flesh is held in no estimation.

The following genera are contained in the family Labridæ:—

1. *Labrus*, of which six British species are described by Mr. Yarrell ('British Fishes').
2. *Cheilinus*. Locality, Indian Ocean.
3. *Lachnolaimus*. Locality, American seas.
4. *Julis*, the Rainbow Wrasse, a Mediterranean species (*Julis Mediterranea*), has been caught off the British coast.
5. *Anampses*. Locality, Indian seas.
6. *Crenilabrus*. Mr. Yarrell figures and describes four British species.
7. *Coricus*. Locality, Mediterranean.
8. *Epibulus*. Locality, Indian seas.
9. *Clepticus*. Locality, Antilles.
10. *Gomphosus*. Locality, Indian seas.
11. *Xirichthys*. Locality, Mediterranean and other seas.
12. *Chromis*. Locality, Mediterranean, the Nile.
13. *Cychla*.
14. *Plesiops*.
15. *Malacanthus*.
16. *Scarus*. To this genus, according to Cuvier, belonged the celebrated fish *Scarus Creticus*, which the ancients esteemed so highly for its flesh.
17. *Calliodon*.
18. *Odax*.

(Cuvier's *Règne Animal*, vol. ii. p. 254.)

LA BRUYÈRE. [BRUYERE, LA.]

LABUAN. [BORNEO.]

LABURNUM, the common name of the European trees named by botanists *Cytisus alpinus* and *C. laburnum*. Laburnum is a native of the Alps of Europe, and is well known in gardens for the beauty of its pendulous racemes of beautiful yellow flowers.

LABYRINTH. [CANDIA.]

LA CAILLE, NICHOLAS LOUIS DE, was born at Rumigny, in the department of Ardennes, March 15, 1713. His father, a retired military officer, was in the service of the Duchess of Vendôme, and, himself attached to science, he endeavoured to cultivate the same taste in his son. He died however while the latter was at the college of Lisieux, and his son was enabled to continue his studies by the generosity of the Duke of Bourbon. He chose theology as his profession; but in passing his first examination he showed so much frankness in his answers to some questions proposed by a doctor of the old school, that this examiner would have

refused him his degree but for the remonstrances of the rest. This incident discouraged him, and he remained content with the title of Abbé, beyond which he never proceeded. He had previously turned his attention to astronomy under great disadvantages; and upon his renunciation of theology he was introduced to James Cassini, who gave him employment at the observatory. In the following year, in conjunction with Maraldi, he made a survey of part of the coast of France, where the talent which he showed occasioned his being employed in the verification of the arc of the meridian. This operation (in which Cassini de Thury was associated) commenced at the beginning of May 1739, and before the end of the year he had completed the triangulation from Paris to Perpignan, had measured three bases, made the requisite astronomical observations at three stations, and had taken a prominent part in the measurement of a degree of longitude. In the winter of 1740, he extended his operations to the mountains of Auvergne, in order to test some suspicions which he had formed upon the accuracy of Picard's measurement. The result of these labours was the complete establishment of the gradual increase of the degree in going from the equator to the poles; which, though long known to be theoretically true, had not previously been confirmed by measurement. In the meanwhile La Caille had been appointed to a chair of mathematics in the Mazarin College, the duties of which he fulfilled with care, and for which he published treatises on geometry, mechanics, astronomy, and optics. He was also employed in the calculation of ephemerides, and in that of eclipses for 1800 years, published in the 'Art de Vérifier les Dates.' In 1746 an observatory was constructed for him at his college, and he began observation on a large scale. The transit instrument being then but little used in France, he had no means of judging of its value; so that with old methods and old instruments he continued his career for fourteen years. In 1751 he made his celebrated voyage to the Cape of Good Hope, where he remained four years or something less. His object was to form a catalogue of southern stars, and up to the present time his results have been in use. He determined the places of about ten thousand stars, and grouped them in constellations; measured a degree of the meridian at the Cape, and made a survey of the Mauritius and Island of Bourbon. He received for his expenses and those of a clockmaker who accompanied him, all instruments included, ten thousand francs; and so accurately did he keep his accounts, that he was able to explain his expenditure to a sou; it was 9144 francs and five sous, and he insisted on returning the balance, in spite of the disinclination of the officers of the Treasury to receive it. He returned to Paris in 1754, and occupied himself in the preparation of his 'Fundamenta Astronomiæ,' for the publication of which he engaged to furnish a bookseller with almanacks for ten years. He now began to use the transit instrument, but with so much doubt of its accuracy, and consequent repetition of observations, that, according to Delambre, the secondary stars observed by him at this time were determined with a degree of accuracy superior to that of the fundamental stars of other observatories. He also published the posthumous works of Bouguer, a small table of logarithms, and various observations. At the end of 1761 he was seized with gout, but he remained during the winter employed in his observatory, passing most nights upon cold stones in the act of observing: a fever was the consequence, and he died March 21, 1762, aged 49 years. His last act was the return of the instruments which he had borrowed, and the intrusting of his manuscripts to his friend Maraldi.

La Caille was an astronomer whose observations will have the highest value as long as astronomy is cultivated; which cannot be said of others, his superiors in originality of discovery. Lalande said of him that he alone had made more observations than all his contemporaries put together; which Delambre states would be no exaggeration, if spoken of the twenty-seven years during which he laboured. But, though his utility was much increased by his extraordinary activity, industry, and honesty, yet his reputation was still more indebted to the genius which he displayed in producing exactness out of imperfect instruments. Delambre remarks that the repeating circles of Lenoir and Reichenbach have not been able to correct the latitude of the Observatory of Paris as determined by La Caille. He also says, 'Having been called upon by singular conjunction of circumstances to go over and verify a great part of the labours of La Caille, after having reviewed with the greatest care all his stars, made long researches on refraction, constructed new solar tables, measured the meridian of France, and had in my hands for several years all the manuscripts of La Caille, I never followed him one step of his track without feeling increased admiration and esteem for a savant who will always be *the* honour of French astronomy.' Delambre is, as we have seen, a severe critic in all quarters, and never shows much, if any, national bias in great questions: an éloge from him is history.

LA CONDAMINE, CHARLES MARIE, was born at Paris on the 28th of January, 1701. Upon leaving college, he entered the army as a volunteer, and forthwith proceeded to take part in the siege of Rosas, where his intrepidity soon rendered him conspicuous; but on the restoration of peace, finding the expectations of promotion which he had previously entertained not likely to be realised, he quitted the military profession, and in 1730 entered the Academy of Sciences as assistant-chemist ('adjoint-chimiste'). Shortly after this he embarked in an expedition to the Mediterranean, having for its object the exploring the coasts of Asia and Africa, and while absent visited Troas, Cyprus, and Jerusalem, and passed five months at Constantinople. Upon his return to Paris, the Academy were busily occupied in discussing the arrangements for a voyage to the equator for the purpose of measuring an arc of the meridian, with a view to the more accurate determination of the dimensions and figure of the earth. From the first mention of this project, La Condamine directed his attention to every branch of science connected with it. 'The very desire,'

says Condorcet, 'of being connected with so perilous an undertaking, made him an astronomer.' His proposals having been accepted by the Academy, who felt how much his natural zeal and courage might tend to the success of the expedition, he again (1735) took leave of his country in company with MM. Bouguer and Godin, and proceeded to Peru. The fatigue and hardships which they had to encounter till their return in 1743, and which were heightened by the discord and jealousy which rose up among them, were exceedingly severe. Upon his return, he published 'An Account of a Voyage up the Amazon,' 1745; and in the same year an abridged account of his 'Travels in South America.' His work, entitled 'The Figure of the Earth as determined by the Observations of MM. de la Condamine and Bouguer,' did not appear till 1749. In 1747 he proposed to his government the adoption of the length of the seconds' pendulum as an invariable unit of measure. In 1748 he was elected a Fellow of the Royal Society of London, and in 1760 a member of the Academy of Sciences of Paris. In 1763 La Condamine and Lalande formed part of the deputation appointed by the Academy to be present at the making of the Report of the Royal Society concerning the inventions of Harrison for facilitating the finding of the longitude. On the 4th of February, 1774, he died while voluntarily undergoing an experimental operation for the removal of a malady contracted in Peru. Always occupied, he appears to have needed time to feel his misfortunes, and notwithstanding his sufferings he appears never to have been unhappy. His wit, the amiability of his temper, and the celebrity of his travels made him many friends, and his humour was generally successful in blunting the attacks of enmity. His curiosity and love of distinction urged him on in the pursuit of information, and ultimately led to his carrying on a correspondence with the learned of all nations upon almost every subject.

The principal works of La Condamine which have not already been mentioned are, 'Measure of the First Three Degrees of the Meridian in the Southern Hemisphere,' 1751; 'History of the Pyramids of Quito,' 1751; 'Journal of the Voyage to the Equator,' 1751; besides numerous scientific memoirs in the 'Transactions' of the Academy of Sciences of Paris, and in those of the Academy of Berlin.

LAC, a resinous substance, which in the East Indies flows from certain trees in the state of a milky fluid, on account of the puncture made by a small insect, the *Coccus ficus*, in their branches, in order to deposit its ova. The trees are principally the *Ficus Indica*, *Ficus religiosa*, and *Rhamnus jujuba*.

There are three kinds of lac known in commerce, distinguished by the names of *Stick Lac*, *Seed Lac*, and *Shell Lac*. Stick Lac is the substance in its natural state; it is of a reddish colour, and incrusts small twigs; when broken off and boiled in water it loses its red colour, and is then termed Seed Lac; and, when melted and reduced to the state of thin plates, it is called Shell Lac, which has a yellowish brown colour.

Dr. John has examined stick-lac, and gives the following as its composition:—Resin, 66.66; Laccin, 16.66; Cochinellin, 3.75; Extractive, 2.50; Cochineal, 2.08; Waxy tallow, 1.66; Salts, &c., and loss, 6.69. Shell-lac is largely employed in the manufacture of sealing-wax. It is also used in varnishes.

Laccin is the substance which remains after the lac has been repeatedly digested in alcohol and water. It is insoluble in water, alcohol, or ether, but is dissolved by concentrated sulphuric acid. Solution of potash also dissolves it readily.

Laccic Acid separates from solution in water, by spontaneous evaporation, in crystalline grains. With the alkalis and with lime it forms salts which are soluble in alcohol and in water, and are deliquescent.

Cochinellin, or the colouring matter of stick-lac, is similar to that of cochineal, is used for the same purposes, and yields a scarlet colour little inferior to it.

Lac Dye and *Lac Lake*, two preparations of lac which are manufactured in the East Indies, are used to a very considerable extent in scarlet dyeing.

LACCADIVE ISLANDS are situated in the Indian Ocean, opposite the coast of Malabar, between 10° and 13° N. lat., and 72° and 75° E. long. They are 17 in number, but only 8 are inhabited. The largest of these islands, Anderot, is only three miles in length and one mile broad. They are based on coral reefs, and are nearly flat. Rice and a few other plants are grown, and cows and poultry reared. The population is said to amount to between 6000 and 7000.

LACE. This fabric differs essentially in form and appearance from the products of an ordinary loom, and until the early part of the present century was made without the employment of machinery. The implements used by hand-lace-makers are few in number, and inartificial in their character. They consist of a pillow or cushion, a series of bobbins or small cylindrical pieces of wood round which the thread or silk employed is wound, and pins which are stuck into the cushion and around which the threads are twisted, the pattern of the lace being determined by the disposition of the pins, and this again being regulated by holes pierced in a piece of parchment which is laid upon the cushion. The principal seat of the lace manufacture in England is Buckinghamshire; but the most esteemed qualities are imported from foreign places, among which Mechlin in Belgium long maintained pre-eminence. Of late years lace-making, as formerly conducted, has very much declined in this country, owing to the greater cheapness of machine-made lace, better known as bobbin-net. The manufacture is principally carried on in and about Nottingham, Leicester, and Derby, and in the west of England. The machines by which this bobbin-net is made are among the most exquisite pieces of mechanism employed in manufactures. Bobbin-net is now often made five yards in width; and the Jacquard Machine is employed in the production of figured-net or lace-net.

LACE BARK TREE. [DAPHNE.]

LACEDÆMON, LACEDÆMONIANS. [SPARTA.]

LACE'PE'DE, BERNARD GERMAIN E'TIENNE DE LA VILLE, COMTE DE, was born at Agen, chief town of the department of Lot-et-Garonne, in France, Dec. 26, 1756. His father, Jean Joseph Médard de la Ville, was lieutenant-general of the Sénéchaussée at Agen. His youth was spent at home in the cultivation of literature and science; and when, for the sake of nominal employment, he obtained a commission in the army, it was in a regiment where he had no duties to perform. This enabled him to cultivate his musical taste, but he abandoned any public display of his talents in this line, after the failure of an opera which he was induced to bring out.

In 1781 he published an essay on natural and artificial electricity, and in 1782 a treatise on physics, entitled 'Physique Générale et Particulière.' These works did not meet with success. Buffon however was much pleased with them, and proposed to him to continue his 'Natural History,' and in 1785 offered him the appointment of curator and sub-demonstrator in the Cabinet du Roi. Lacépède gladly accepted the offer, and left the army. He now applied himself with energy to natural history, and published his 'Histoire Naturelle des Quadrupèdes, Ovipares, et des Serpents,' in 1788–89. Lacépède formed classes, orders, and genera, but his arrangement was, like that of Linnæus, artificial and unphilosophical, founded only on external characters, without reference to internal organisation. After the death of Buffon, when France became disturbed by the Revolution, Lacépède took an active part in political affairs; he was successively invited to fill the posts of president of Paris, commandant of the national guard, and deputy extraordinary for the town of Agen in the Legislative Assembly of 1791, of which he was elected president. When the Jardin du Roi was converted by the Convention into a public school, and named the Museum of Natural History, a new chair of zoology was created for him. In 1798 he brought out the first part of his 'Histoire Naturelle des Poissons.' In 1804 his 'Histoire Naturelle des Cétacés' was published. In 1799 he was elected a member of the senate, and was made president in 1801. From 1803 till the Restoration he filled the office of grand chancellor of the Legion of Honour. He was a member of the Institute at the time of its formation, and afterwards of the Academy of Sciences. He died October 6, 1825.

LACERTA (the *Lizard*), a constellation of Hevelius, surrounded by Andromeda, Cepheus, Cygnus, and Pegasus.

LACE'RTIADÆ, or *Lacertians*. Under the family name of *Lacertians* Cuvier arranged—

1. The *Monitors* and their subdivisions, viz. the *Monitors* properly so called, including the *Ourans* of the Arabs (*Varanus*), &c.; the *Dragons* (*Crocodilurus* of Spix, *Ada* of Gray); and the *Sauvegardes* (*Monitor* of Fitzinger and Ameiva).

2. The *Lizards* properly so called. This second group comprises, according to Cuvier, the genera *Lacerta*, *Algyra*, and *Tachydromus*.

MM. Duméril and Bibron make the *Varanians*, or *Sauriens Platynotes* (Broad-Backed Saurians), a family which comes immediately after the *Geckotians* in their *Erpétologie*. They allow that the *Varanians* are nearly allied to the *Lacertians*, as modified by them, and rest the distinctions of the former family from the latter—1st, on the presence in the latter of polygonal scales which cover the head; 2nd, on the form of the scales of the back and of the belly, and their non-compressed tail; and, 3rd, on the form and disposition of the teeth, which are not distant, obtuse, and conical, but placed on the same line, and trenchant at their summit in the antero-posterior direction.

As the family of the *Varanians* is highly interesting, and the differences between that family and the *Lacertiadæ* are not very wide, it will be most instructive to treat of both in the same article. [VARANIDÆ.]

LACISTEMA'CEÆ, a small and obscure natural order of incomplete exogenous plants, containing a few arborescent species, inhabiting the woods of tropical America, in low places.

LACONIA. [LACONICA.]

LACO'NICA, called by the Roman writers *Laconia*, a country of ancient Greece, was bounded on the W. by Messenia, on the N. by Arcadia and Argolis, and was surrounded by the sea on the E. and S. Laconica is a long narrow valley, running from north to south, between two mountain masses which stretch from Arcadia to the southern extremity of the Peloponnesus: the western range, which terminated in the promontory of Tænarum, now Matâpan (36° 23′ N. lat.), the most southerly point of Greece, was called Taÿgetus; and the eastern, terminating in Cape Málea, was known by the names of Parnon, Thornax, and Zarex. The drainage of this valley is collected in the river Eurótas, which flows from the high lands of Arcadia. From its source to its junction with the Œnus, a little above Sparta, the Eurótas flows through a deep and narrow valley. In the lower part of its course the valley of the Eurotas is of considerable breadth. Between the mountains which form the eastern boundary of the valley of the Eurotas and the sea there was a narrow strip of land, which contained the towns of Delium, Minoa, and Epidaurus Liméra, belonging to Laconica. The area of Laconica was probably about 1896 square miles. The district of Thyreátis, on the borders of Argolis, was conquered by the Spartans about 547 B.C.

The snow remains on the highest points of Taÿgetus to the month of June: the streams on the eastern slope of this mountain-range are abundant. The orange-tree is in bloom at Mistra, near the ancient Sparta, when the summits of Taÿgetus are still wrapped in snow.

On the west the range of Taÿgetus formed an almost insuperable barrier to any invading force; and on the north there were only two natural passes by which the country could be entered. There are no good harbours on the coast; but the island of Cythéra, at the entrance of the Laconian Bay, contained several good harbours, and it belonged to the Lacedæmonians. Gythium, on the coast of the mainland, was the naval station of the Spartans.

There were no large towns in Laconica except Sparta. [SPARTA.] One of the most ancient towns was Amyclæ, the residence of the Achæan kings, situated a little to the south of Sparta, in a fertile plain.

The Léleges, according to the most ancient traditions of Laconica, were the earliest inhabitants. At the time of the Trojan war Laconica was in possession of the Achæans, who settled in Laconica at a very early period, and probably conquered the Léleges. During the reign of Tisámenus Peloponnesus was invaded by the Dorians, and Laconica fell to the share of Aristodémus, or his sons Eurýsthenes and Procles. The condition of the original inhabitants of the land, and their relation to their Dorian rulers, belong to the history of SPARTA.

(Strabo, lib. viii.; Pausanias, *Laconica;* Leake's *Morea;* Müller's *Dorians.*)

LACQUERING. [JAPANNING.]

LACROIX, SYLVESTRE-FRANÇOIS, was born at Paris in 1765. He studied under Monge, who obtained for him in 1782 the situation of professor of mathematics to the Marine School at Rochefort, whence he was recalled to Paris by Condorcet in 1786 to supply his own place at the Lyceum.

From this time till his death (May 24, 1843), his life is only a record of the elementary works which he published and the posts of instruction which he filled; and both are too numerous to recapitulate. Lacroix was in 1820 the most remarkable elementary writer of mathematical works in Europe: he had published a complete course, in a style of his own, distinguished by judgment of selection and simplicity of execution. For a long time he gave the tone to elementary mathematical writing. If his works are now in a great measure superseded, it is because a more accurate school has been formed. Lacroix drew largely on those convenient suppositions by which the algebra of the latter half of the 18th century was much deteriorated in rigour; and even in geometry he was content with methods which the disciple of Euclid cannot tolerate. But the good of Lacroix lives in the works of the successors who have amended his defects: though none but those who have examined the writers who preceded him can know how much the sciences are indebted to the improvements which he made in teaching them.

The work by which the name of Lacroix will live is the treatise on the Differential and Integral Calculus, in three volumes 4to. (1810–1814.) This is not an elementary work, but a collection of all that was then known on the subject. It will always have an historical value, as embodying the best view of the state of mathematical analysis at the beginning of the 19th century. The elementary abridgment of this work was translated into English by MM. Peacock, Herschel, and Babbage, in 1816, and was the instrument by which the continental analysis was introduced into this country, which, by its adherence to the Newtonian method of fluxions, had almost isolated itself from the rest of the world.

LACTA'NTIUS, LUCIUS CŒLIUS (or *Cæcilius Firmianus Lactantius*), one of the Latin fathers, lived at the end of the third and the beginning of the fourth century. He is generally supposed to have been an African. On the invitation of Diocletian, he went to Nicomedia, where he taught rhetoric. He became afterwards preceptor to Crispus, the son of Constantine, in Gaul. The time of his death is not known.

His chief works are the 'Divine Institutions,' in seven books, written in reply to two heathens who wrote against Christianity at the beginning of Diocletian's persecution; an 'Epitome of the Divine Institutions,' the first five books of which were not extant in Jerome's time, but were discovered and published by Pfaff in the year 1712; a treatise on the 'Workmanship of God;' a treatise on the 'Wrath of God;' and a work entitled 'Symposion,' which he wrote when he was very young. He also wrote an 'Itinerary from Africa to Nicomedia,' a work entitled 'Grammaticus,' two books to Asclepiades, and eight books of Epistles, all of which are lost.

Complete editions of his works were published by Heumann at Göttingen in 1736, and by the Abbé Lenglet, 2 vols. 4to., Paris, 1748.

LACTEALS (from *lac*, milk) are so called from their containing an opaque white milky fluid. They are the system of vessels by which the chyle or nutritive part of the food, is conveyed from the intestines to the left subclavian vein, in which it is mixed with the blood. They have their origin in the villi of the small intestines, which are short hair-like processes, each consisting of a fine network of lacteal vessels, surrounded by capillary arteries and veins. [DIGESTION.]

LACTIC ACID. This substance exists in milk, and in larger proportion when it has become sour; it also exists in various other animal fluids and in many vegetable juices. Lactic Acid is colourless, inodorous, very sour, and may be so concentrated as to have a specific gravity of 1·215; it attracts moisture from the air, and dissolves in water and alcohol in all proportions. When concentrated lactic acid is heated gradually, it becomes more fluid, darker-coloured, and yields acetic acid and inflammable gas, charcoal, and a white solid matter, which is both sour and bitter; when this is dried between folds of bibulous paper, and afterwards dissolved in alcohol, it yields perfectly white rhombic crystals, which are anhydrous lactic acid. The crystalline acid consists of O H^4 C^6.

The lactates are not an important class of salts. Lactate of ammonia is deliquescent and uncrystallisable. Lactate of potash and lactate of soda are deliquescent, soluble in alcohol, and, by evaporation in vacuo, they become crystalline masses. Lactate of lime and lactate of barytes yield gum-like products. The lactates of alumina, peroxide of iron, and copper, do not crystallise; but lactate of magnesia and lactate of zinc crystallise in quadrilateral prisms, and lactate of silver in colourless needles.

LACTU'CA, a genus of plants belonging to the natural order *Compositæ*. *L. virosa*, Acrid Lettuce, is found on hedges, old walls, and the skirts of fields throughout Europe. It yields a milk

juice, which when procured and dried has the name Lactucarium. [LACTUCARIUM.] This substance is also procured from the garden lettuce (*L. sativa*). [LETTUCE.] *L. scariola*, Prickly Lettuce, is not so acrid as *L. virosa*, but possesses the same properties.

LACTUCA'RIUM is obtained from the *Lactuca virosa*, being the inspissated milky juice of the plant, and which is at first white, but afterwards, by exposure to the air and sun, concretes and becomes brownish. The juice of the leaves only should be collected before the flowering has begun; puncturing the leaves is the best mode of procuring it.

The inspissated concrete juice resembles opium in its action, but is much feebler. In pulmonary diseases it is often a useful sedative. The common garden lettuce also possesses sedative properties, and eaten towards bedtime has often contributed to procure rest in cases of morbid vigilance, or to allay pains of the stomach.

LADAKH, is a kingdom in Asia, situated to the east of Cashmere, from which it is separated by a branch of the Himalaya Mountains. On the east and north it is bounded by Tibet. It is part of the central plateau of Asia, and has a general elevation of about 9000 feet. Its mountains do not rise to a great height above this elevated base, but the surface is a continual succession of ascents and descents, many of which are very steep. Through the middle of the country runs the valley of the river Indus, which passes the towns of Roodok and Leh, and receives the waters of the Shayuk and other tributaries. There are several lakes, most of which are salt, and furnish great quantities of that article.

As the surface of the country is so elevated above the sea, its climate is cold, the winters are long and severe; but the summers, on the other hand, are hot and dry.

Wheat, barley, and turnips are grown very extensively. Wood is scarce. Part of the country is laid out in pasture. Cattle, sheep, horses, goats, asses, and dogs are kept. The small race of sheep produces excellent wool.

Leh, the capital of the country, contains about 1000 houses, each several stories high, and substantially built. There are several bazaars, each containing from twelve to fourteen shops. Leh is a place of great trade, being the principal entrepôt for the shawl wool, and three great fairs are annually held here, at which merchants attend from China, Tibet, the Panjab, and Cashmere. Roodok, on the right bank of the Indus, but higher up the river, is another place of considerable traffic.

The inhabitants of Ladakh belong to the same race as the inhabitants of Tibet. Their sovereign resides at Leh. Ladakh has a considerable commerce with surrounding countries, the chief article of which is the wool of the goats, which is used in the manufacture of shawls.

LA'DANUM, sometimes written *Labdanum*, but incorrectly, a gum resin produced by several species of *Cistus*. *C. ladaniferus*, *C. Creticus*, *C. laurifolius*, and *C. Ledon* are usually mentioned as the species which are indigenous in the Grecian Islands, in Spain, Italy, and the south of France. That obtained from the Levant is the most celebrated. The juice exudes upon the leaves and branches of these shrubs, and is collected, according to Tournefort, by means of an instrument resembling a rake, with leather thongs instead of teeth, which is drawn over the plant; the juice adheres to the thongs, and is afterwards separated.

LADING, BILL OF. [BILL OF LADING.]

LADOGA, LAKE. [RUSSIA.]

LADRONE ISLANDS extend between 13° and 20° 30′ N. lat., and between 144° and 145° 30′ E. long., and are about 20 in number. They are mostly of a volcanic character, and are very rugged; but they yield nearly every kind of intertropical product, such as cotton, rice, indigo, Indian corn, sugar, cacao, cocoa-nuts, tobacco, plantains, &c. Cattle, horses, mules, and asses are numerous. The principal island is Guajan, which is about 80 miles in circumference. Its capital, S. Ygnacio de Agaña, has an open roadstead, and a good harbour a few miles further north. Tinian, another island, exhibits extensive ruins, which indicate that these islands were once inhabited by a people well acquainted with the arts of civilisation. The islands were discovered by Magelhaens in 1521, and were settled by the Spaniards in the middle of the next century. The aborigines have now almost disappeared, and the Spaniards are few, the chief inhabitants being settlers from Mexico and the Philippines.

LÆMODI'PODA, Latreille's fourth order of *Crustaceans*, placed by him between the *Amphipoda* and the *Isopoda*. He describes them as being the only forms among the *Malacostraceans* with sessile eyes, whose posterior extremity does not present distinct branchiæ, and which have hardly any tail, the last two feet being inserted at that end, or the segment to which they are attached being followed by not more than one or two other joints, which are very small. They are also, he states, the only ones in which the two anterior feet (which agree with the second jaw-feet) make a part of the head.

The *Læmodipoda* of Latreille have all four setaceous antennæ carried upon a peduncle of three joints, mandibles without palps, a vesicular body at the base of four pair of the feet at least, beginning with the second or third pair, reckoning those of the head. The body, which is most frequently filiform or linear, is composed (reckoning the head) of from eight to nine joints, with some small appendages, in form of tubercles, at its posterior and inferior extremity. The feet are terminated by a strong hook. The four anterior feet, of which the second are the greatest, are always terminated by a monodactylous claw. In many the four succeeding feet are shortened, less articulated, without any hook at the end, or rudimentary, and not at all fit for ordinary use. The females carry their eggs under the second and third segments of the body, in a pouch formed by approximated scales.

The *Læmodipoda* are marine, and Savigny considers them as approaching the *Pycnogonids*, and making, with that form, the passage from the *Crustaceans* to the *Arachnids*.

Latreille brought the forms under one genus, *Cyamus*, with certain subdivisions and subgeneric appellations.

(Cuvier's *Règne Animal*, vol. iv. p. 126.)

LAENNEC, RENE' THEOPHILE HYACINTHE, was born at Quimper, in Lower Brittany, in 1781. The first part of his medical education was conducted by his uncle, Dr. Laennec, a physician at Nantes, and in 1800 he went to Paris, where he attached himself to the Hôpital de la Charité. In 1814 he took the degree of doctor of medicine. In the same year he became chief editor of the 'Journal de Medicine.' In 1816 he was appointed chief physician to the Hôpital Necker, and made the remarkable and important discovery of mediate auscultation. [Auscultation.] He was subsequently appointed professor of medicine in the College of France, and professor of clinical medicine. He had previously (1819) published his 'Traité de l'Auscultation Médiate.' But labour and study eventually undermined his health; and he died of consumption in 1822.

Laennec's work on mediate auscultation is undoubtedly the most important which the present century has produced in medical science. Most of his other works are published in the 'Dictionnaire des Sciences Médicales,' in the articles 'Anatomie Pathologique,' 'Ascarides,' 'Cartilages Accidentels,' 'Dégénération,' 'Desorganization,' 'Detrachyceros,' 'Encephaloide,' 'Filaire.'

A Life of Laennec by Dr. Forbes is prefixed to his Translation of the 'Traité de l'Auscultation Médiate.'

LAER, P. VAN. [Bamboccio.]

LA FAYETTE. [Fayette, La.]

LA FONTAINE. [Fontaine, La.]

LAGENA'RIA, a genus of plants belonging to the natural order *Cucurbitaceæ*. *L. vulgaris*, common Bottle-Gourd, has a fruit in shape like a bottle, when ripe of a pale yellow colour, sometimes six feet in length. When dried, it becomes hard, and is used to contain water; it is then of a pale bay colour. In its wild state this plant produces a poisonous fruit. This species grows abundantly in Egypt and Arabia.

LAGERSTRŒ'MIA, a genus of plants of the natural family of *Lythraceæ*. The species are few in number, but most of them are highly ornamental.

LAGNY, THOMAS FAUTET DE, was born at Lyon in 1660, and died at Paris, April 12, 1734. At an early period his scientific attainments led to his being appointed hydrographer royal at Rochefort. He was elected member of the Royal Academy of Paris in 1696; associate-geometrician in 1699; veteran pensioner in 1723; and fellow of the Royal Society of London in 1718. His published works and memoirs in the 'Transactions of the Royal Society,' all on mathematical subjects, are numerous.

LA'GO MAGGIO'RE, the ancient *Lacus Verbánus*, the largest lake in Italy, extends about 40 miles in length from north to south, separating Lombardy from Piedmont, and stretching at its northern extremity into the Swiss canton of Tessin. Its greatest breadth is 8 miles; but it is much less at the north and south extremities. The elevation of its surface above the sea is 678 feet and its greatest depth is 1100 feet. The principal affluents of the Lago Maggiore are:—the Toccia which comes from the Val d'Ossola; the Maggia which flows through the valley of that name; the Ticino, coming from the St. Gothard; and the Tresa, which flows out of the neighbouring lake of the Lugano. The outlet of the lake is formed by the Ticino, which issues from the Lago Maggiore at Sesto, and divides Austrian Lombardy from Sardinia to its junction with the Po. About the middle of the length of the lake, and in its broadest part, where it forms a gulf indenting the western shore, is a group of beautiful islands called Isole Borromée, from the family name of the proprietor. They are four in number, Isola Madre, Isola Bella, Isola dei Pescatori, and the Isolino, the smallest of all. The Lago Maggiore abounds with fish, and a considerable trade is carrried on in steamboats and barges between the various points of its coast. The Simplon road follows its western shore from Feriolo to Arona.

LAGONEGRO. [Basilicata.]

LAGOON, or LAGUNE. Lagoons are sheets of water formed either by the encroachments of rivers or seas upon the land, or by the separation of a portion of the sea by the intervention of a bank. Thus there are fluvial and marine lagoons. The former are not confined to the lower parts of water courses, though they are most frequently there. Marine lagoons are the most common. They are formed sometimes by the encroachments of the sea, and sometimes by the throwing up of a bar or bank, which eventually divides off a portion of the sea altogether, or leaves merely a small opening. In Europe there are many marine lagoons: the Adriatic, on its north and north-western parts particularly, is full of them. The Zuyder Zee with the Sea of Haarlem is a vast lagoon.

LAGOS. [Algarve.]

LAGOS. [Guinea.]

LAGRANGE, JOSEPH LOUIS DE, was born at Turin, 25th January, 1736. His parents were Joseph Luis Lagrange and Marie Thérèse Grass, the daughter of a physician at Cambiano. His father held the office of treasurer of war at Turin, and had once been in affluent circumstances but had ruined himself by injudiciously entering into hazardous speculations. To this circumstance, which was then regarded as a misfortune, Lagrange himself has frequently attributed a considerable share of his subsequent fame and happiness. 'Had I been rich,' he has been heard to say, 'I should probably not have become a mathematician.'

In the early part of his studies he manifested no particular love either for the pure mathematics or the physical sciences. His chief delight consisted in the perusal of the Latin authors, especially the works of Cicero and Virgil. These however were soon superseded by the synthetical writings of the ancient geometricians, and these in their turn gave place to the more powerful analysis of modern times. The perusal of a memoir by Dr. Halley ('Phil. Trans.,' 1693) 'On the superiority

of modern Algebra in determining the foci of Object-Glasses,' is said by his biographers to have convinced him of the utter inadequacy of geometrical methods as instruments of investigation; and it is not improbable that this might have been the occasion of his selecting the path which he thenceforth pursued with so much honour to himself and so great advantage to science.

Before he attained the age of nineteen he was appointed to the professorship of mathematics at the military college of Turin, where by far the greater part of his pupils were older than himself. The year following (1755) he addressed a letter to Euler, relative to the isoperimetrical problems, and that of the curve of quickest descent, which had engrossed so much of the attention of the principal mathematicians of the day, and of Euler in particular; but, owing to the want of general methods, their labours had proved but partially successful. Each problem had been resolved by methods peculiar to itself, and the solutions rested upon artifices unsatisfactorily indirect. In this letter Lagrange communicates the germs of his calculus of variations.

In 1758 he took an active part in the foundation of the Royal Academy of Turin, in which he was unanimously chosen the director of the physico-mathematical sciences. The following year appeared the first volume of the 'Transactions' of that Society, consisting principally of the researches of Lagrange on the propagation of sound, and on the integration of differential equations, and those of finite differences. He here also proves, on the subject of vibrating chords, that the time of oscillation is independent of the figure of the chord,—an empirical truth, the demonstration of which D'Alembert believed to be impossible. Lagrange and D'Alembert were rivals, but not opponents. Their cause was a common one, which each laboured to promote with indefatigable zeal. The manner in which their controversies were conducted shows that they were prepared to sacrifice every personal feeling to their love of truth and the advantage of science. When either attempts the refutation of his rival's theory, it is frequently by means of the beautiful theorems to which the researches of the other has already led. On the other hand, a discovery of importance, by whichever party it may happen to be made, is immediately followed by the congratulations of him from whom congratulation is due.

The calculus of variations is eminently important in many branches of the mathematics, as in the determination of the maxima and minima values of indefinite integral formulæ, &c.; but its utility is most conspicuous in the higher branches of physical astronomy.

When the Academy of Berlin was threatened with the departure of Euler for St. Petersburg, Frederick renewed his importunities to D'Alembert to succeed him. [D'Alembert.] D'Alembert however, from various motives, being unwilling to quit his native country, suggested that the proffered honour might be conferred upon Lagrange. Lagrange was accordingly appointed professor of the physical and mathematical sciences to the Academy, and continued for more than twenty years to enrich the memoirs of that Society with his researches connected with physical astronomy and other subjects of importance. The insignificant stipend (1500 crowns) which was allotted to him, when contrasted with the munificent offers made to D'Alembert, cannot fail to strike every reader with surprise. Lagrange quitted Berlin after the death of Frederick, not being satisfied with the treatment he then received. He had previously been invited by the ministers of Louis XVI. to settle in Paris.

In 1772 M. Lagrange was elected foreign associate of the Royal Academy of Paris, and in 1787, on his arrival at the French capital, he received the honorary title of veteran pensioner. Apartments were allotted to him in the Louvre; and here, surrounded by the principal mathematicians of the day, he continued to live happily up to the time of the Revolution. After this he began to be subject to fits of melancholy, which so far increased upon him that he has been heard to say that his enthusiasm for the sciences was extinguished, and that his love of physical research had disappeared. He was successively appointed professor of mathematics to the normal and polytechnic schools, member of the Institut, of the board of longitude, grand officer of the legion of honour, and count of the empire. He died at Paris, the 10th April, 1813, in his 78th year. His remains were deposited in the Pantheon, and his funeral oration was spoken by his illustrious friends Laplace and Lacépède.

'Among those who have most effectually extended the limits of our knowledge,' said Laplace, in his funeral oration, 'Newton and Lagrange appear to have possessed in the highest degree the happy art of detecting general principles, which constitutes the true genius of science. This art, joined to a rare elegance in the exposition of the most abstract theories, characterised Lagrange.' His work on Mechanics, resting upon the method of variations of which he was the inventor, flows wholly from a single formula, and from a principle known before his time, but of which no one but himself was able to appreciate the importance. 'Among the successors of Galileo and Newton,' says Professor Hamilton, speaking of the theoretical development of the laws of motion, 'Lagrange has perhaps done more than any other analyst to give extent and harmony to such deductive researches, by showing that the most varied consequences respecting the motions of systems of bodies may be derived from one radical formula; the beauty of the method so suiting the dignity of the results as to make of his great work a kind of scientific poem.'

LAGRIIDÆ (*Lagriariæ*, Latreille), a family of coleopterous insects of the section *Heteromera*. Latreille assigns to it the following genera:—*Lagria*, *Statyra*, and, with a doubt, *Hemipeplus*. (*Règne Animal*, vol. v. p. 51.)

LAGU'RUS, a genus of plants belonging to the natural order *Gramineæ*. *L. ovatus*, the only species, is found in sandy places in Guernsey, and on the continent of Europe.

LA HARPE. [Harpe, La.]

LAHIRE, PHILIPPE DE, was born at Paris, March 18, 1640, in which city he also died, 21st of April, 1719. Up to the age of twenty-four years he followed the profession of his father, who had acquired considerable reputation as professor of painting and sculpture to the Royal Academy. In 1660 he visited Italy, partly for the improvement of his health, and partly with a view to the completion of his professional education. While at Venice, he applied himself to the study of geometry, and more particularly to the conic sections of Apollonius; and, a few years after his return to Paris, he published several treatises upon those subjects, which fully established his claim to the reputation of a profound geometrician. In 1679, Colbert having suggested the construction of a general map of France, Picard and De Lahire were nominated by the king to conduct certain surveys along the coast of Gascony, and in 1683 De Lahire, in conjunction with Dominic Cassini, was instructed to proceed with the measurement of the meridian, which had been commenced in 1669 by Picard. [PICARD.] The death of M. Colbert having put a stop to this important undertaking, he was next employed in determining the difference of level of the river Eure and the reservoir of Versailles, preparatory to the construction of an aqueduct for the supply of the capital, which he effected to the satisfaction of the king and of Louvois, the then minister. The other public works in which M. de Lahire was successively engaged were numerous and important, but our limits will not permit us to notice them more particularly. He was twice married, and 'each of his marriages,' says M. Fontenelle, 'furnished an Academician.'

LAHORE, a principality which lies in the north-western angle of Hindustan, and is nearly coincident with the country called the *Panjab*. It is of a triangular form, and extends from about 29° to 33° N. lat., the boundary on the west being the Indus, on the south-east the Beas and Garra, and on the north the Hill States and Cashmere. [HINDUSTAN.] *Lahore*, the capital of the principality, is situated in 31° 27′ N. lat., 74° 26′ E. long., on the south-eastern bank of the Ravee. It is a place of great antiquity, and was the residence of the first Mohammedan conquerors of Hindustan, before they succeeded in establishing themselves in the central parts of the peninsula. The city and suburbs are of great extent, and the population is said to amount to 80,000.

L'AIGLE. [ORNE.]

LAINEZ. [JESUITS.]

LAING, MALCOLM, an historian, was born in Orkney, in 1762. He studied at Edinburgh, and in 1785 he joined the Scottish bar, but does not appear to have obtained much practice as a lawyer. His first known literary effort was editing the last volume of Henry's 'History of Britain,' in 1793, after the author's death. In 1800 he published 'The History of Scotland, from the Union of the Crowns, on the accession of James VI. to the throne of England, to the Union of the Kingdoms in the reign of Queen Anne, accompanied by 'Two Dissertations, historical and critical, on the Gowry Conspiracy, and on the supposed Authenticity of Ossian's Poems.' To the second edition of his History, published in 1804, he added 'A Preliminary Dissertation on the Participation of Mary, Queen of Scots, in the Murder of Darnley.' He was for some time member of parliament for Orkney, and enjoyed the confidence and esteem of Fox. He died in 1818.

LAIRESSE, GERARD, was born at Liège in 1640. He followed the profession of a painter at Utrecht, where he met with little encouragement. He afterwards removed to Amsterdam, which proved the means of raising him to fortune and reputation.

The number of paintings which he executed was very great. They are of unequal merit, but all bear marks of genius. The treatise on the art of painting which goes by his name was not written by him, but compiled from his observations during his blindness, and published after his death, which happened in the year 1711.

LAITY, persons not clergy; that is, the whole population except those who are in holy orders. All the lexicographers, we believe, agree in deriving it from the Greek word *laos* (λαός), the people. A *layman* is one of the laity. [CLERGY.]

LAKE, GERARD, first *Viscount Lake*, was born July 27, 1744. Having entered the army at the age of 14, and made his first campaigns in the Seven Years' War, he served in the American War, in Holland with the Duke of York in 1793, and was appointed to the chief command in Ireland during the Rebellion of 1797-8. In 1800 he was sent as commander-in-chief to India, during the Marquis of Wellesley's government. By a series of successes the whole of Sindia's possessions north of the river Chumbul fell into his hands; and in reward General Lake was raised to the peerage, Sept. 1, 1804. In 1804-5, Lord Lake again took the field in the same part of India, against Holkar. He returned to England in Sept. 1807, and was created a Viscount Oct. 31. He died Feb. 20, 1808.

LAKES are sheets of water of greater or less extent, surrounded on all sides by land, as islands are by water. They are distinguished from ponds by the fact that a lake is fed by streams either flowing at the surface of the soil or subterraneous, while a pond, however large, is only the accumulation of rain-water in some hollow. Thus ponds are usually dried up in hot weather, while true lakes are only temporarily diminished by heat.

The principal difference in lakes is this:—1, some have no apparent affluents nor outlets: 2, others have affluents without any visible outlet: 3, some have an outlet without any visible affluents: 4, others have both affluents and an outlet.

1. Lakes without apparent affluents or outlets are comparatively small, and yet they are, relatively speaking, more permanent than large lakes, because, being fed chiefly by subterraneous springs, they are not liable to be filled by those deposits of earth and sand which are the main cause of the rapid desiccation of such lakes as receive the troubled waters of torrents and rivers. Small lakes of this kind sometimes occur in hollows resembling the craters of extinct volcanoes.

2. Of lakes which receive affluents without having any visible outlet, the largest is the Caspian. The Aral and the Dead Sea are also examples of this kind of lake, which is very common in Asia. The excess of water brought into lakes that have no outlet is supposed to be carried off by evaporation, and in some cases perhaps by infiltration or subaqueous drainage also. Several of these lakes have formerly had outlets; but water has ceased to flow from them, because the lakes have sunk in consequence of receiving now a much smaller quantity of water than formerly.

3. Lakes that have an outlet without any apparent affluent are fed by subaqueous springs, which, bursting out in a hollow, must fill it up before the waters can flow off in a stream. These lakes are generally situated at considerable elevations above the level of the sea. Thus there is one on Monte Rotondo in Corsica, at an elevation of 9069 feet. From lakes of this kind some of the largest rivers take their rise; the Volga, for instance, springs from such a lake in the government of Tver in Russia.

4. Lakes which receive one or more tributary streams and have a visible outlet for their superabundant waters are the most common and the largest; such are the lakes of Geneva, Maggiore, Ladoga, Onega, Baikal, Superior, Huron, Erie, Ontario, &c.

Lakes differ very much in temperature, transparency, and in the colour of their waters. Those fed by the water of melted snows in summer are generally much colder than would be thought conformable with the season; but the difference is principally in the lower waters, which, being cold, remain at the bottom by reason of their greater density. Some never freeze, which is owing to their great depth.

The remarkable transparency of certain lakes is truly astonishing; thus the waters of Lake Superior and of the Norwegian lakes are so pellucid that fish, shells, and rocks may be seen at a depth incredible to persons who have never visited these regions. Elliot, in his 'Letters from the North of Europe,' says, 'Nothing appears more singular to a foreigner than the transparency of the waters of the Norwegian lakes. At the depth of 100 or 120 feet the surface of the ground beneath is perfectly visible; sometimes it may be seen wholly covered with shells, sometimes only sprinkled with them; now a submarine forest presents itself to view, and now a subaqueous mountain.'

With regard to the colour of lakes, it may be observed that it is sometimes very difficult to account for the tints of large masses of water. The colour of the bottom, the depth, the shadows and reflected colours of surrounding bodies, subaqueous vegetation, springs, and many other circumstances, affect the colour of lakes.

Lakes perform a very important function in the economy of the earth. Rain does not always fall; and, were it not for lakes, the greater number of rivers would be dried up in summer, and canals could not have a constant supply of water. The humidity which these sheets of water occasion by their evaporation is also eminently favourable to the vegetation in their environs.

LALANDE, JOSEPH JEROME LE FRANÇAIS DE, was born at Bourg in the department of Ain, July 11, 1732. His parents were Pierre le Français and Mary Monchinet, of whom he was the only son. By their inordinate indulgence and extreme solicitude in anticipating all his wishes, he soon contracted habits of impatience and an irritability of temper, which, in after years, he frequently found himself unable to control. Surrounded by Jesuits, and nurtured by his mother in the strict observance of devotional ceremonies, we are told that at the age of ten years it was not unusual for him, being disguised as a priest, to deliver a sermon of his own composition, to a select society, who requested as a favour to be present at the declamations of so precocious an orator.

When about thirteen or fourteen years old, he was sent to a college at Lyon, where for a time he appears to have derived equal pleasure from the study of poetry and eloquence, and from attending the lectures of the several professors on natural and metaphysical philosophy. Upon the occurrence of the great eclipse of 1748, of which, with the assistance of his tutor Le Père Béraud, he made a telescopic observation, he took great interest in the explanation given to him of that phenomenon, and thenceforward showed a more decided partiality for the mathematical sciences. But it was the perusal of Fontenelle's 'Entrétiens sur la Pluralité des Mondes,' which, more than any other circumstance, influenced his choice of a profession, by familiarising him with the sublime speculations of astronomers, and nourishing that love of distinction which characterised the whole of his career. In order that he might devote himself more exclusively to the pursuit of the mathematics, he requested permission of his parents to become a Jesuit; but they now entertained views of a more ambitious and worldly nature, and, instead of yielding to his request, held out the prospect of obtaining for him a lucrative appointment in the law, if he would consent to adopt that profession.

Under the pretext of acceding to their wishes, he removed to Paris, where he commenced the study of jurisprudence; but his first visit to the observatory decided his vocation, for he immediately determined upon attending the course of astronomy at the College of France. Delille, who had recently returned from Russia, was then professor of astronomy to that institution. They soon became mutually attached to each other, and Lalande was in the habit of frequenting the house of his tutor, where his mathematical difficulties could be more readily removed, and where he could gain experience in astronomical observation.

About the same time he likewise attended the lectures of Lemonnier. But, notwithstanding the ardour with which Lalande applied himself to his favourite science, the study of the law was not altogether neglected. At the age of eighteen he received from the judicial authorities of Paris the title of Advocate; soon after which he received instructions from his parents to return to Bourg,

where they were anxious that he should practise his profession for some years. A fortuitous circumstance induced them to abandon the plans which they had formed for the promotion of his welfare and happiness.

Lacaille, who was at that time about to take his departure for the Cape of Good Hope, with a view to the more exact determination of the moon's parallax, had called upon the astronomers of Europe to forward the object of his voyage by making observations at their respective observatories, similar to those which he contemplated making himself at the Cape. The favourable position of Berlin, which has nearly the same longitude, while it differs in latitude by nearly the fourth part of the earth's entire circumference, suggested to Lemonnier the peculiar advantages which would accrue from observations made at the observatory of that city. But it so happened that there were no instruments of any value at that observatory, and no person of ability had been appointed to its superintendence. Lemonnier instantly offered the use of his own instruments; and at his recommendation the Academy confided to Lalande the responsibility of making the necessary observations. When Maupertuis presented Lalande to Frederick, the latter, as might be expected, expressed his surprise at receiving so young an astronomer—for Lalande had not then completed his nineteenth year,—but after many flattering expressions he gave orders that everything should be done which could tend to the attainment of the object in view. Here, during the latter part of the year 1751, and the early part of 1752, Lalande passed most of his nights in the observatory; his mornings, in studying the mathematics under Euler; and his evenings in the society of Maupertuis, Voltaire, D'Argens, and La Mettrie. After completing his observations, the substance of which he communicated in a memoir to the Academy of Berlin, he returned to Paris, where the Royal Academy expressed their unqualified approbation of his conduct, and immediately elected him a member of their society. From his election till within a few years of his death, he contributed regularly to the 'Transactions' of the Academy, and from this time his popularity as an astronomer may be dated.

The expected return of Halley's comet had led Clairaut to investigate the amount of the perturbations to which it would be subject. Lalande, with the assistance of Madame Lepaute, supplied him with all the numerical computations of which he had need; and, when the appearance of the comet had realised their predictions, he wrote its history, which appeared in 1759, appended to a translation of Halley's planetary tables. In 1760 he was appointed editor of the 'Connaissances des Temps,' in which he introduced many important alterations, and gave to it the form which it has since retained. In 1762 he succeeded Delille as professor of astronomy to the College of France.

In 1764 he published his large treatise on astronomy, which he afterwards extended to four volumes 4to. The work contains many biographical and historical notes, which will always be interesting, and the results of numerous observations, to which it will always be useful to recur.

In 1772 he published his 'Account of the Transit of Venus,' observed 3rd June, 1769, which was drawn up with considerable labour from the communications of those persons who, at his recommendation, had been sent by several of the European governments to different parts of the globe, in order to observe the phenomenon.

Lalande died at Paris, 4th April, 1807, in his 75th year. As an observer, an author, and a tutor, he undoubtedly did much for the promotion of astronomy; but, looking to the state of the mathematics at the time in which he lived, his knowledge of them appears to have been very limited. The candour and the warmth of his disposition gave full relief both to his virtues and his defects. He regarded concealment of any kind and under any circumstances as disreputable to an honourable man; and, acting up to this opinion, he invariably expressed his sentiments without the slightest reserve, even when by so doing he prejudiced his own interests and those of his dearest friends. His love of truth, and the boldness with which he attempted to subvert all systems and opinions which did not accord with his own, and which sometimes partook rather of a spirit of fanaticism than of pure philosophy, excited against him a crowd of detractors and enemies. The extreme irritability of his temper led him on several occasions to acts of ingratitude towards Lemonnier, his early tutor and friend, who, to use Lalande's own expression, 'refused to see him during an entire revolution of the moon's nodes.' His attachment to his native town was such that he made a point of visiting it every alternate year during the college vacation; and upon these occasions he gave public lectures, founded an Academical Society, and neglected nothing which might inspire a love of science and of letters. His filial affection induced him frequently to attend the devotions of his mother, although the creed which she had so zealously endeavoured to inculcate had been greatly modified, if not altogether eradicated, by his intercourse with Voltaire and others while at Berlin.

To conclude: although his moral character is not altogether irreproachable, he was always ready to patronise the needy votary of science, and he would advocate the cause of a friend at the risk of his own personal safety. His publications were very numerous.

LAMA, LAMAISM, is the name given to the Buddhist religion in Mongolia and Tibet. Lama in these languages properly means priest. The title is given to the head of every monastery, and every Lama is considered a vicar of the deity, and requires implicit obedience to all his commands, like the Dalai Lama himself.

LAMARCK, JEAN BAPTISTE PIERRE ANTOINE DE MONNET, CHEVALIER DE, was born Aug. 1, 1744, at Bazentin in Picardy, of a noble family. Destined originally for the church, he was educated in the Jesuits' college at Amiens; he then entered the military service which he was compelled to quit in consequence of a wound. He now devoted himself to science

and formed a new classification of the plants in the Jardin du Roi, Paris, on a system formed of the most easily reconciled theories of Jussieu and Linnæus, and also on the older system of Tournefort. He named his work the 'Flore Française,' which appeared in 1780, bearing the date of 1778, in 3 vols. 8vo. In 1779 Lamarck was elected a member of the ancient Academy of Sciences. He next made a botanical tour through Germany and the Low Countries, in company with the son of Buffon, and on his return was admitted to the botanical excursions of Rousseau. The results of his researches appeared in the 'Encyclopédie Méthodique,' the first volume in 1783, and the second in 1788. The publication of the 'Encyclopédie' was arrested by the breaking out of the Revolution.

Lamarck however remained unmolested. He had been appointed assistant to Daubenton in the Cabinet du Jardin du Roi, in 1788; and, on the establishment of the institution of the Museum in 1793, he was appointed to the department containing all those classes of the animal kingdom which comprise the invertebrata. The 'Systême des Animaux sans Vertèbres,' published in 1801, was the fruit of his researches, and laid the foundation of his greater work, the 'Histoire Naturelle des Animaux sans Vertèbres,' published at Paris from 1815 to 1822, in 7 vols. 8vo. Lamarck commenced his lectures in the Museum in 1794, and he continued to deliver them up to 1818, when, becoming almost blind and very infirm, he was obliged to resign. His eyes became affected during the compilation of his last work, the 'Mémoires sur les Coquilles,' published in the 'Annales du Muséum.' He died in Paris in December 1829.

LAMB. [SHEEP.]

LAMB, CHARLES, was born Feb. 18, 1775, in Crown Office Row, Inner Temple, London. He was educated at Christ's Hospital; but, labouring under an impediment of speech, which prevented his succeeding to an exhibition in one of our universities, he became in 1792 a clerk in the accountant's office in the India House, in which he continued till March 1825, when he was allowed to retire upon a pension. Being unmarried, he dwelt through life with an only sister, whose occasional fits of insanity caused him continual anxiety, of which a painfully interesting account is given by Mr. Sergeant Talfourd in his 'Final Memorials of Charles Lamb' (1849). He died Dec. 27, 1834.

Lamb's first appearance as an author was in a small volume of poems published jointly with Coleridge and Lloyd. His popularity depends principally on his prose writings.

His works are contained in 2 vols. 12mo., 1818, 'Essays of Elia, Album Verses,' &c., 1830; 'Specimens of English Dramatic Poets who lived about the time of Shakspeare,' 1808. They have been republished by Mr. Moxon.

LAMBALLE. [CÔTES-DU-NORD.]

LAMBARDE, WILLIAM, the son of John Lambarde, an alderman of London, was born Oct. 18, 1536. In 1556 he entered at Lincoln's Inn as a student. The first fruits of his studies appeared in a collection and translation of the Saxon laws, under the title of 'Ἀρχαιονομία, sive de Priscis Anglorum Legibus Libri,' 4to., 1568. His 'Perambulation of Kent,' finished in 1570, was published in a small quarto volume in 1576. In 1578 he was admitted a bencher of Lincoln's Inn, and in 1579 was appointed a justice of the peace for the county of Kent,—an office which he explained in his 'Eirenarcha, or the Office of the Justices of the Peace,' in four books, 4to., 1581. He also published a small treatise on 'The Duties of Constables,' &c., 8vo., 1582. In 1592 he was appointed a master in chancery, in 1597 keeper of the rolls and the house of the rolls in Chancery Lane, and in 1600 keeper of the records in the Tower. He died Aug. 19, 1601. His 'Archeion, or a Discourse upon the High Courts of Justice in England,' was not published till 1635. The materials which he had collected for a general account of Great Britain were published in 1730, in 4to., under the title of 'Dictionarium Angliæ Topographicum et Historicum.'

LAMBERT, JOHN, was born probably about 1620, and was educated for the bar. On the breaking out of the contest between the king and the parliament, he joined the parliamentary army, and held the rank of colonel at the battle of Marston Moor (2nd July, 1644). After distinguishing himself at Naseby, with Cromwell in Scotland, at Worcester, and on other occasions, and rising to the rank of major-general, the appointment of Fleetwood to the chief command of the forces in Ireland produced an alienation between Lambert and Cromwell which was never wholly healed, although he was one of the officers whom Cromwell summoned in June 1653, and was appointed in May 1655, by the Protector one of his eleven major-generals. After the death of Cromwell, he became the soul of the confederacy of discontented officers which was formed against the new protector Richard. [CROMWELL, RICHARD.] On the breaking out of the Royalist insurrection in July 1659, he was sent by the Rump Parliament to suppress it; but immediately after his success he turned round upon the parliament, and, on its resistance to his demands, dispersed it on October 13. At the beginning of January 1660, having been deserted by the force with which he had set out for the north to encounter Monk, he was seized by orders of the restored parliament, and committed to the Tower. On the 9th of April following he made his escape from confinement; but the activity of Colonel Ingoldsby recaptured him at Daventry, on the 22nd of the same month. He was eventually banished to the island of Guernsey, where he lived for above thirty years.

LAMBERT, JOHANN HEINRICH, was born at Mühlhausen Aug. 29, 1728. He was sent to a school in the town, where he acquired the rudiments of a classical education; but the want of means obliged his father to withdraw him thence at an early age.

At home, however, the youth availed himself of every means in his power to preserve the knowledge he had acquired of the Latin tongue; and a great part of each night was spent in reading

such of the Roman authors as he could procure, or in studying arithmetic and geometry. At seventeen years of age he became the secretary of Dr. Iselin at Basel; and during the five years in which he held this situation he omitted no opportunity of extending his literary and scientific attainments. In 1749, on the recommendation of his patron, he was appointed tutor to the children of M. de Salis, who was then the President of the Swiss Confederacy; and, while communicating instruction to his pupils, he was enabled to study the Greek, Italian, and French languages, as well as to advance his knowledge of optics, astronomy, and philosophy.

In 1756 Lambert accompanied two of the sons of M. de Salis to the University of Göttingen; and, after proceeding thence to Holland and France, he returned in 1758 to Coire. In 1763 he was employed as one of the Commissioners in settling the boundaries between the territories of the Valais and the duchy of Milan; and in the following year, in consequence of an invitation from the King of Prussia, he proceeded to Berlin, where he passed the remainder of his life. He died Sept. 25, 1777.

Lambert published, at the Hague, a tract, entitled 'Les Propriétés de la Route de la Lumière,' &c. (8vo., 1758); and in the following year he published at Zürich one which was designated 'Freye Perspective.' But one of the most important of Lambert's works is his 'Photometria, sive de Mensura et Gradibus Luminis, Colorum, et Umbræ,' which was published both at Leipzig and at Augsburg in 1760. In 1761 he published at Augsburg a valuable work entitled 'Insigniores Orbitæ Cometarum Proprietates,' 8vo., and in 1764 was published, at Leipzig, in 2 vols. 8vo., his philosophical work entitled 'Neues Organon;' this is divided into four parts, of which the first contains the rules of thinking, and the second is on truth considered in its elements; the third is on the external characters of truth; and the fourth, on the means of distinguishing the real from the apparent.

The first mathematical work which Lambert published after he went to reside at Berlin was his 'Beyträge zum Gebrauche der Mathematik und deren Anwendung' (3 vols. 8vo., 1765 to 1772); and, besides these works, he wrote numerous papers on scientific subjects, which were published in the 'Acta Helvetica' and in the 'Mémoires' of the Academy of Berlin.

LAMBESC. [Bouches-du-Rhône.]

LAMBETH. [Surrey.]

LAMBOURN. [Berkshire.]

LAMEGO. [Beyra.]

LAMELLIBRANCHIATA, M. De Blainville's third order of *Acephalophora* (*Acéphales Testacés* of Cuvier). M. De Blainville divides this order into ten families, each family containing several genera. The families are—*Ostracea*, *Subostracea*, *Margaritacea*, *Mytilacea*, *Polydonta* or *Arcacea*, *Submytilacea*, *Chamacea*, *Conchacea*, *Pyloridia*, and *Adesmacea*. M. Rang's arrangement is different. He separates the order into two primary divisions—*Monomyaria* and *Dimyaria*, each having its respective families.

LAMELLICORNES (Latreille), one of the sections of the order *Coleoptera*, in which the antennæ of the insects are inserted in a small hollow in front of the eyes, and are usually composed of nine or ten joints, the last of which are large, flat, and open like a fan. Latreille divides the Lamellicornes into two great tribes, *Scarabæides* and *Lucanides*. (Cuvier, *Règne Animal*, vol. iv. p. 526.)

LA'MI, GIOVA'NNI, born at Santa Croce, in Tuscany, in 1697, studied law at Pisa, took a doctor's degree, and afterwards repaired to Florence, to exercise his profession. But his fondness for classical and ecclesiastical learning interfered with his professional pursuits, and he became an author. His first work was in defence of the Nicene Creed concerning the Trinity, and against Leclerc and others. Lami contended that the Nicene dogma concerning the Trinity was the same as that held by the early promulgators of Christianity in the apostolic times. His work is entitled 'De recta Patrum Nicenorum Fide,' Venice, 1730. In 1732 he was made librarian of the Riccardi library at Florence, and Professor of Ecclesiastical History in the Florence Lyceum. At Florence he published his work 'De Eruditione Apostolorum,' Florencè, 1738, which is a sort of continuation of his former work. Lami's work contains much miscellaneous learning concerning the early ages of Christianity.

Lami made a selection of inedited works, or fragments of works, from the MSS. of the Riccardi library, which he published in a series entitled 'Deliciæ Eruditorum,' 18 vols. 8vo., Florence, 1736-69. He also edited the works of the learned John Meursius in 12 vols. folio, and other works. He died in 1770, and was buried in the church of Santa Croce. He left all his property to the poor. Besides the works already mentioned and referred to, Lami wrote satires both in Latin and in Italian, especially directed against the Jesuits, whom he strongly disliked.

(Corniani, *I Secoli della Letteratura Italiana.*)

LAMIA'CEÆ, or LABIA'TÆ, a very extensive and important natural order of exogenous plants. The species are generally aromatic and tonic,—a property which is in most cases owing to the secretion of a volatile oil in little cysts or glands occupying the leafy organs. The aromatic qualities are familiar to us in the Sage, Marjoram, Thyme, Basil, and similar plants, commonly cultivated for the service of the kitchen, as condiments; of Lavender, so much valued for its peculiar fragrance; of Mint and Peppermint, well known for their stimulating power, and of many others. Betony, Ground Ivy, Horehound, and others, are examples of the bitter tonic qualities of such plants.

LA'MIUM, a genus of plants belonging to the natural order *Labiatæ*, which includes the Dead, Blind, and Dumb Nettles of our peasants, so called from their resemblance to the *Urticæ* in many points, except their stings. *L. amplexicaule* is found in sandy and chalky fields in Great Britain, the North of Africa, and Middle Asia. *L. intermedium* is common in Scotland, Sweden, and the North of Germany. *L. purpureum* is

found in Great Britain and Sweden, where, according to Linnæus, it is boiled and eaten. *L. incisum* is a British plant, and is likewise found in France, Germany, and Sweden. *L. album* was once used medicinally, but is now disregarded. This species is eaten in Sweden as a pot-herb. It is found in Great Britain and the southern parts of Europe.

There are several other species of Lamium, growing chiefly in the southern parts of Europe.

LAMLASH. [BUTESHIRE.]

LAMMAS DAY, the name for the first of August, from the Anglo-Saxon *Hlaf Mæsse*, Loaf Mass or Feast, when the Saxons offered an oblation of loaves made from new corn.

LAMOUROUX, JEAN-VINCENT-FELIX, was born at Agen in Guienne, in 1779. In 1809 he was appointed professor of Natural History at Caen, where he wrote his 'Histoire des Polypiers Coralligènes flexibles.' Among his other writings is a 'Dictionary of Zoophytes,' which forms part of the 'Encyclopédie Méthodique.' He died at Caen, March 18, 1825.

LAMP. [LIGHTS, ARTIFICIAL.]

LAMP-BLACK, a kind of fine charcoal prepared from certain kinds of fir containing much resin, and the refuse and residuary resin left by the distillation of turpentine. The furnace chimney is long, and the greater part of it nearly horizontal, and its exit is covered with old sacking; or the smoke containing the charcoal is carried into chambers, where it is deposited on coarse cloths. The purest lamp-black is procured by the combustion of oils, but that is much too expensive for common use. Lamp-black is extensively employed as a black colour, and mixed with other pigments.

LAMP, SAFETY. It has been long known that coal mines, and especially such as are deep, are occasionally infested with carburetted hydrogen, known to the miners as *fire-damp*. Several contrivances have been proposed for safely lighting coal mines subject to the visitations of this gas; but the safety-lamp of Sir H. Davy is the only one which has ever been judged safe, and been extensively employed.

Davy found that this gas requires an admixture of a large quantity of atmospheric air to render it explosive; that explosions of inflammable gases are incapable of being passed through long narrow metallic tubes; and that this principle of security is still obtained by diminishing their length and diameter at the same time, and likewise diminishing their length and increasing their number, so that a great number of small apertures will not pass explosion when their depth is equal to their diameter. This led to trials upon sieves made of wire gauze; and he found that, if a piece of wire gauze was held over the flame of a lamp, or of coal gas, it prevented the flame from passing; and he ascertained that a flame confined in a cylinder of very fine wire gauze did not explode even a mixture of oxygen and hydrogen, but that the gases burnt in it with great vivacity.

These experiments enabled Davy to determine the principles of a new safety-lamp. It consists of a cylinder of wire gauze, formed of iron wire about $\frac{1}{30}$ of an inch in diameter, the meshes being about $\frac{1}{28}$ of an inch. The wire cylinder is strongly jointed, and is defended by three upright strong wires, which meet at the top, and to them a ring is fixed, from which the instrument is suspended. The lamp is screwed on to the bottom of the wire gauze, and is supplied with oil by the pipe projecting from it, when the top is unscrewed and removed. A wire, bent at the upper end, is passed through the bottom of the lamp for raising, lowering, or trimming the wick.

When the lamp is lighted and introduced into an atmosphere gradually mixed with fire-damp, the first effect of the fire-damp is to increase the size and length of the flame. When the inflammable gas forms as much as $\frac{1}{13}$ of the volume of the air, the cylinder becomes filled with a feeble blue flame, but the flame of the wick appears burning brightly within the blue flame, and the light of the wick continues till the fire-damp increases to one-sixth, or one-fifth, when it is lost in the flame of the fire-damp, which in this case fills the cylinder with a pretty strong light; and, when the foul air constitutes one-third of the atmosphere, it is no longer fit for respiration.

The operation of the wire gauze in preventing the communication of flame is thus explained:—Flame is gaseous matter so intensely heated as to be luminous, and the temperature requisite for producing it exceeds that of the white heat of solids. When the flame comes into contact with wire gauze, it loses so much heat in consequence of the conducting power of the metal which conveys it to the surrounding air, that it is cooled below the point at which gaseous matter can remain luminous, and consequently the flame of the gaseous matter burning within the lamp is incapable of passing through it so as to set fire to and explode the mixture of fire-damp and air by which it is surrounded; and this cooling power is exerted, even though the wire gauze, by effecting it, is rendered and remains red-hot.

Much discussion has arisen concerning the safety of this instrument: it is admitted that there are situations where it would not be danger-proof, but it is also admitted that no other invention is yet equal to it in respect to safety.

LAMPETER. [CARDIGANSHIRE.]

LAMPREY. [PETROMYZON.]

LAMPYRIDÆ (*Lampyris*, Linn.), a family of coleopterous insects of the section *Malacodermi*, in the great group of Latreille's *Serricornes*. To this family belong the genera *Lygus*, *Dictyoptera*, *Omalisus*, *Lampyris*, and others. To the genus *Lampyris* belongs the Glow-Worm (*Lampyris noctiluca*, Linn.). This insect is rather more than half an inch in length, of a blackish colour; the thorax is margined with dusky red, the legs and the edges of the segments of the body of the same colour. The female resembles the male, but is quite destitute of wings, and the terminal segments of the abdomen beneath are yellowish; the thorax is semicircular; the body is very soft, of an oblong form, pointed at the extremity, and composed of ten segments. The male glow-worm is said to emit the phosphorescent light in a slight degree, but it is chiefly the female from which the brilliant light proceeds which we so often see on banks, beneath hedges, and in various other situations. This light proceeds from the under part of the abdomen and near the tip, and it appears that the animal has the power of varying its intensity. Glow-Worms will live, we are informed by Latreille, a long time in vacuo, and in different kinds of gases, the nitrous acid, muriatic, and sulphurous gases excepted, for in these they soon expire. When placed in hydrogen gas, they sometimes detonate. If the luminous portion of the abdomen be removed, it retains its luminous property for some time, and when apparently extinct it may be reproduced by softening the matter with water. The insects emit a brilliant light if immersed in warm water, but in cold water it is extinguished. The females being apterous, and consequently restricted in their powers of locomotion, and the insect being nocturnal, it is supposed that the light emitted by the female is for the purpose of attracting the other sex. The larvæ may be kept alive for a considerable time; they feed voraciously upon snails, killing those of the largest size; sometimes they seize a snail whilst crawling, and, when the animal retires within its shell, they still keep their hold, and allow themselves to be carried into the shell with the snail, and, although they become enveloped in the mucous secretion, it very seldom appears to adhere to their bodies. Upon being touched or disturbed in any way, they emit the phosphoric light, but not to so great a degree as the perfect insect.

LANARKSHIRE, or CLYDESDALE, is an inland county of Scotland, bounded N. and N.W. by the shires of Stirling and Dumbarton, W. and S.W. by those of Renfrew and Ayr, E. and N.E. by those of Linlithgow, Edinburgh, and Peebles, and S. by Dumfriesshire. It is comprised between 55° 15′ and 55° 56′ N. lat., and between 3° 23′ and 4° 23′ W. long. The greatest length N. by W. to S. by E. is 52 miles; the greatest breadth E. to W. is 33 miles. The area is 926 square miles. The population in 1841 was 426,972.

Lanarkshire is divided into three districts, named the Upper Ward, Middle Ward, and Lower Ward.

The Upper Ward, or southern part of the county, is covered by hills and mountains, of which the highest elevations are about 2400 feet. On the summits of the hills and sides of the mountains are pastured numerous flocks of sheep, and in the valleys the sheep are intermingled with herds of black cattle. The Clyde and its tributaries, the Douglas, Avon, Calder, and several smaller rivers, have their sources in these mountains. [CLYDE.] In this part of the county are seams of excellent coal, which are advantageously wrought, iron-ore, lead-mines, freestone, and slate. The arable portion of this ward is inconsiderable, and chiefly on the banks of the Clyde and its tributaries.

The Middle Ward is diversified by gently undulating grounds, there being no plains of any extent except in the valley along the banks of the Clyde. The prevailing soil is of a clayey nature intermixed with sand. In some parts it consists of a deep fertile loam, resting upon a subsoil of loose gravel; in others it partakes more of a mossy character, and yields, in early seasons, good crops of oats, flax, and rye-grass-hay, but in cold or late seasons the oats do not ripen well. Oats and barley form the principal crops, but there is also much wheat raised both in this and the adjoining ward to the north. This ward is also rich in a mineralogical point of view, containing an abundance of sandstone, iron-stone, and coal.

The Lower Ward, or northern part of the county is of very limited extent, but, as it contains the city of Glasgow, it is a very important one. There are immense fields of fire-clay, and the quality is considered fully equal to the Stourbridge clay. In their vicinity are extensive works for the manufacture of crucibles, &c. There is a considerable proportion of arable land, but the soil of some parts is moist and moorish. Many of the mosses have been reclaimed, and they are all gradually lessening by peat-cutting, so that oats, rye-grass, and even wheat, now grow luxuriantly where once the moor-fowl fed and the long heath waved. The wheat is sown from the end of August to the beginning of November, and sometimes, though very rarely, in spring.

Nearly three-fourths of the land of this county belong to large proprietors. The dairy system has been prosecuted with great success. The cows are mostly of the Ayrshire breed. The sheep are generally black-faced. The draught horses of this county are held in great estimation in the north of England and throughout the south of Scotland.

The climate of the county is almost as various as its soil. The Lower Ward, being more open to the sea breezes which prevail from the W. and S.W., is comparatively temperate. The climate in the Upper Ward is unusually severe.

At the time of the Union a considerable trade was carried on in the towns and villages of Lanarkshire in collecting linen yarn for the English markets, and many branches of the linen manufacture had been brought to considerable perfection. The rapid rise however of the city of Glasgow, both in commerce and wealth, has led to the discontinuance of most of the small establishments which were dispersed over the county, and more particularly those which were centrally situated. Those which now exist are rather to be considered as so many branches of the extensive

establishments of Glasgow, which city comprehends nearly the whole of the population, manufactures, and commerce of the county.

The Monkland Canal passes through the royalty of Glasgow, and affords a cheap communication between Glasgow and the collieries and iron-works in the neighbourhood of Airdrie. The Ardrossan Canal extends from Port Eglington to Ardrossan, 33 miles. Railways extend from Glasgow to the Carlisle and Edinburgh Railway, one branch passing by Airdrie, and another by Lanark, and there are other smaller railways.

The county returns one member to parliament, the city of Glasgow returns two, and the Falkirk district returns one, including the boroughs of Lanark, Hamilton, Airdrie, Falkirk, and Linlithgow.

The following are the principal towns, with the population of each in 1841 :—

Airdrie is a well-built town, 10 miles S.E. from Glasgow. It possesses the privileges of a royal burgh, and is contributary to the Falkirk parliamentary district. Airdrie contains a neat town-house, which includes a town-hall, police-office, and prison. The prosperity of the town has arisen chiefly from the coal-works and iron-works in the vicinity. Population of the town, 12,418.

Glasgow. [GLASGOW.]

Hamilton, a handsome though irregularly built town, is pleasantly situated near the confluence of the Avon Water with the river Clyde, 11 miles S.S.E. from Glasgow. It is a burgh of regality, dependent upon the Duke of Hamilton. Hamilton Palace is a very superb building, and contains many valuable paintings. The town contains a new prison and public offices. It is included in the Falkirk parliamentary district. Population of the town, 8876.

Lanark, the county town of Lanarkshire, is 24 miles S.E. by S. from Glasgow, and is situated nearly in the centre of the county, near the east bank of the Clyde. It is a place of great antiquity. The appearance of the town has been greatly improved of late years, and at present there are many handsome houses built of freestone. The chief public buildings are the commercial bank, county-hall, prison, parish church, and grammar-school. There are circulating and subscription libraries. Population of the town, 4831.

New Lanark is a well-built village to the south of the town of Lanark, and on the east bank of the Clyde.

Rutherglen, 2½ miles S. from Glasgow, on the west bank of the Clyde, contains a population of 5632. Coals are shipped down the river, and there are print-works and bleaching grounds in the neighbourhood.

LANCASHIRE, a northern county of England, is bounded N. by Cumberland and Westmorland, E. by Yorkshire, S. by Cheshire, and W. by the Irish Sea. Its form is irregular: the district of Furness, a portion of the county on the north-western side, is separated from the rest by the Bay of Morecambe, and by a narrow strip of the county of Westmorland. Its greatest length, not including Furness, is about 64 miles, and the greatest breadth about 24 miles. The county is comprehended between 53° 20′ and 54° 25′ N. lat., and between 2° 0′ and 3° 15′ W. long. The area is 1766 square miles. The population in 1841 was 1,667,054.

Surface and Coast-line.—The inland part of Furness is an integral part of the Cumbrian Mountains. Mountains rising to the elevation of between 2000 and 3000 feet are separated by narrow valleys watered by mountain-streams, or occupied by lakes. Towards the coast the mountains and hills subside; there are no cliffs, and in some parts the coast is occupied by bogs, or, as they are provincially termed, 'mosses.' Furness is distinguished into two parts, according to the character of the surface; the mountainous part is Upper Furness; the low flat towards the shore is Lower Furness. The main portion of the county is hilly towards the north and east; but the sea-coast district of the northern half, and nearly the whole of the southern half, are flat. The principal Lancashire elevations are:—Old Man, in Coniston Fells, 2577 feet; Pendle Hill, 1803; Bleasdale Forest, 1709; Boulworth Hill, 1689; Rivington Moor, 1545. In the southern half there are extensive sands along the coast at low water; towards the north the coast forms a deep bay, of which Rossall Point and the southern point of Furness form the extremities. A tongue of low land projecting near the mouth of the Lune divides this large bay into the two smaller ones of Lancaster and Morecambe. A large area of these bays becomes dry sand at low water.

The only islands along the coast are off the southern extremity of Furness. Walney Island, the largest, extends from north-west to south-east about 8 miles, in width nowhere more than one. The other islands of the group, Foulney, Pile of Fouldrey, Sheep Island, Roe Island, Dova How, and Old Barrow Ramsey, are all small.

Geological Character.—The uppermost formation is the new red sandstone, which is covered near the south coast by moss or peat; and from Preston by Garstang to Lancaster it is covered by the clays, marls, and peat-mosses of the Fylde district. The peat-mosses contain great quantities of large timber-trees, the remains of ancient forests. To the coal-field of South Lancashire the county owes its manufacturing pre-eminence. It occupies a large irregular tract between the Ribble and the Mersey. The pits in the northern coal-field are chiefly in the neighbourhood of Hornby. The millstone-grit forms the heights which skirt the eastern side of the county. North of the Lune the county is chiefly occupied by the carboniferous or mountain limestone. Furness is occupied partly by the last-mentioned rock, and partly by slate rocks.

The principal mineral production of Lancashire is coal. Lead and iron occur to some extent. Copper in small quantity, slate, flag-stones, freestone, scythe-stones, brick clay, and pipe-clay are among the mineral products of the county.

Rivers and Lakes.—The rivers that water this county have their general course from N.E. to S.W., those of Furness excepted, which flow from N. to S. The principal rivers are the Lune in the north, the Wyre and the Ribble in the centre, and the Mersey and Irwell in the south.

The Lune is formed by streams which rise in Langdale Fells and Shap Fells in Westmorland; it enters Lancashire near Kirkby Lonsdale, and flows by a wide æstuary into Lancaster Bay. The length is about 48 miles. The Lune receives the Greta, the Wenning, and many small mountain streams, and is navigable from Lancaster to the sea.

The Wyre rises in the Yorkshire moorlands, flows through this county to the bay of Lancaster, and enters the sea near Rossall Point by a deep æstuary. Its length is about 27 miles. The Ribble rises in the Yorkshire mountains, a little to the east of Whernside; enters Lancashire near Clitheroe; flows past Preston into a wide shallow æstuary, and enters the Irish Sea. It receives the Hodder, Calder, and Darwen.

The Mersey rises in Yorkshire, from different sources which together form the Tame; this stream flows past Stayley Bridge and Ashton-under-Line to Stockport, where it is joined by the Goyt, and assumes the name of Mersey. The lower part of its course is described elsewhere. [CHESHIRE.] The navigation of the Mersey begins at Stockport. Its principal Lancashire tributaries are the Irwell and the Irk. The Mersey is about 70 miles long, and the Irwell 40.

There are several small streams in the county or on its boundaries; among which are the Winster, Duddon, Leven, Douglas, and Alt.

There are in Furness two considerable lakes, Winandermere or Windermere, and Coniston Water. Windermere, which belongs in part to Westmorland, is about 11 miles long, and varies from 500 to 1700 yards in breadth. It is the largest lake in England, and its greatest depth is rather more than 200 feet. It receives the waters of many mountain streams, and of Esthwaite Water and a few small lakes: the united waters flow by the Leven into Morecambe Bay. Coniston Water is about 6 miles long, and rather less than one broad, with a maximum depth of 240 feet. The other lakes of the county are all very small.

Canals and Railways.—The Sankey Canal was the first executed in England; it extends from St. Helens to Warrington, about 12 miles. The Duke of Bridgewater's Canal, one of the most celebrated of Brindley's works, extends from Leigh to Manchester, with extensive tunnels and underground works at Worsley. The Leeds and Liverpool Canal, one of the most extensive in the kingdom, connects those two important towns, and passes near Colne, Burnley, Blackburn, Wigan, and Ormskirk. The Lancaster Canal begins near Kendal in Westmorland, and runs almost due south to Lancaster and Preston; here the canal is for a few miles replaced by a railroad which crosses the Ribble on a viaduct bridge; but the canal recommences on the south side of the Ribble valley, and runs to Wigan. The Ashton Canal commences on the eastern side of the town of Manchester, and runs to Fairfield, about 4 miles from Manchester, on the road to Ashton. It has branches to Stockport; to the Huddersfield Canal at Duckinfield; to the collieries at Hollinwood, near Oldham; and to the Rochdale Canal. The Huddersfield and Peak Forest canals belong rather to Yorkshire and to Derbyshire respectively than to Lancashire. The Rochdale Canal commences in the Calder and Hebble Navigation in Yorkshire, and proceeds by Todmorden and Rochdale to Manchester. The Manchester, Bolton, and Bury Canal commences in the Mersey and Irwell Navigation at Manchester, and runs to Bolton, with a branch to Bury.

The first railway formed in Lancashire was probably that which is part of the line of the Lancaster Canal at Preston already noticed. The first locomotive line in England was the Liverpool and Manchester. Since the opening of that railway in 1830, the railways of Lancashire have taken the lead of those in every other county. The lines open, or in process of formation, in April 1849 (omitting mention of the particular companies to which they belong), are the following:—Liverpool to Manchester; Warrington to Newton; Warrington to Heyton; Runcorn to St. Helens; Runcorn to Heyton; Liverpool to Bury; Liverpool to Preston; Manchester to Preston; Newton to Preston; Kenyon to Bolton; Bolton to Clitheroe; Clifton to Colne; Manchester to Todmorden; Manchester to Stockport, to Ashton, and to Oldham; Preston to Accrington; Preston to Fleetwood; Preston to Lancaster; and many minor branches.

Climate and Agriculture.—The climate of Lancashire is mild and moist. The high hills which run along its eastern boundary shelter it from the cold easterly winds, but at the same time arrest the clouds which come from the Atlantic, and produce more abundant rains than occur in the eastern parts of England.

Near the coast the land is level, and the soil consists of a good sand over a rocky subsoil, or a clay marl, which, when mixed with the upper soil, renders it extremely productive, especially in garden vegetables. From the moist nature of the climate, Lancashire is more productive in grass than in corn. Oats are more cultivated than wheat. Potatoes were early cultivated in the fields in Lancashire, and they retain their celebrity when raised in the lighter soils, and when not over-manured. Early potatoes are sometimes raised, with a crop of turnips after them the same year; then follow wheat or barley, and grass-seeds.

Meadows and pastures are very extensive. Even the extent of grass which is kept for the purpose of bleaching linen on is very considerable, especially in the neighbourhood of Manchester, of Bolton, and of other manufacturing towns. While in other parts of England meadows and pastures are broken up and converted into arable fields, in Lancashire the reverse is the case, and many fertile arable fields have been laid down in permanent grass.

Sheep are not abundant in proportion to cows; and there is not much attention paid to the breed of this useful animal. The original breed of oxen in Lancashire was one of the best in England until it was surpassed by the Leicestershire, which is only the same blood improved by careful selection. A great quantity of new milk is required in the manufacturing towns, and much butter and cheese are also made in the county. There is a

great demand for horses in the manufacturing towns. They are chiefly cart-horses of a hardy active sort; and, with a little attention, the rearing of them is profitable to the farmer.

Commerce and Manufactures.—Lancashire is the most important manufacturing county in England. Not only is the cotton manufacture the largest branch of industry, but it has probably no parallel in any other country. The cotton factories are exceedingly numerous, and are spread over most parts of the county. Silk, woollen, and flax manufactures are also carried on, but to a much smaller extent than cotton. Engineering of every description, and ship-building, are other branches of Lancashire industry. Iron and brass manufactures; hat factories; glass, bottle, and pottery works; alkali, soap, and chemical works; pin manufactories; watch movement manufactories; are among the numerous branches of Lancashire industry.

The commerce of Lancashire consists mainly in the immense trade carried on at Liverpool: the shipping at Lancaster and Fleetwood is of no great amount. The canals and railways conduct a vast inland traffic with other parts of England.

Divisions and Towns.—Lancashire is divided into six hundreds. It is in the diocese of Chester. It is in the northern circuit. The assizes for the northern division of the county are held at Lancaster; for the southern division, at Liverpool. For parliamentary purposes the county is divided into North Lancashire and South Lancashire, each of which returns 2 members to parliament. The boroughs of Blackburn, Bolton, Lancaster, Liverpool, Manchester, Oldham, Preston, and Wigan, return 2 members each; and Ashton-under-Lyne, Bury, Clitheroe, Rochdale, Salford, and Warrington, return 1 each: total, 26 members.

The following are the principal towns, with the population of each in 1841 :—

Ashton-under-Lyne. [Ashton-under-Lyne.]

Ashton-in-Mackerfield is on the road between Warrington and Wigan, 3 miles N.N.W. from Newton, and about 17 miles N.E. by E. from Liverpool. It is one of the boroughs disfranchised by the Reform Act. The inhabitants are chiefly employed in the cotton and hardware manufactures. Population of the township, 5410.

Blackburn. [Blackburn.]

Blackpool, a sea-bathing place, is situated on the coast of the Irish Sea, 18 miles W.N.W. from Preston, and 27 miles S.W. from Lancaster. There is a branch railway to Blackpool from the Preston and Fleetwood Railway. There are hotels and other watering-place accommodations. Population of the place, 1304.

Blackrod, a considerable manufacturing village, within 7 miles S.S.W. from Bolton. It stands on the edge of some elevated ground, on the south side of the river Douglas. Blackrod is a place of considerable antiquity. The church is an ancient structure; and there is a free grammar-school, which was endowed in 1568. Population of the chapelry, 2615.

Bolton. [Bolton.]

Broughton-in-Furness, a small market-town, 8 miles N.W. from Ulverstone. The town is situated on the declivity of a gentle eminence, with a south aspect. The houses are built of stone, and roofed with blue slate. The place has been considerably improved of late years. Its principal trade consists in the making of brush stocks and hoops. The æstuary of the Duddon is navigable to within about half a mile of the bridge at full tide. Slates, iron, grain, &c., are exported, and oats and general merchandise imported. The Furness Railway furnishes a line of communication between Fleetwood and Broughton. Population of the chapelry, 1250.

Burnley, a market town and chapelry, 25 miles N. from Manchester. It is a station on the Lancashire and Yorkshire Railway. It is situated on a tongue of land on the banks of the Brun, near the confluence of that river with the Calder. The greater part of the town is of recent erection, and is built of the freestone found in the neighbourhood. Extensive improvements have been made and are making in the town, which is well lighted, paved, and supplied with water. The staple manufacture is cotton, of which a very large amount is produced. The woollen trade formerly had the ascendancy, but it has declined. The Leeds and Liverpool Canal, which nearly surrounds the town, opens a communication for the conveyance of goods through the whole line of country from the German Ocean to the Irish Sea. Coal and slate are abundant. The parish church is a mixture of various styles of architecture, having been rebuilt and enlarged several times. A free grammar school has existed in the town since the Reformation. It is well endowed. Population of the chapelry, 10,699.

Bury. [Bury.]

Cartmel is about 13 miles N.W. from Lancaster, across the sands of Morecambe Bay. The town is situated in a narrow well-wooded vale, watered by a small stream, and overhung on the east by the high ridge of Hampsfield Fell. The streets are narrow and irregular. The houses are principally built of stone. The church, which formerly belonged to a priory, was purchased at the Dissolution by the inhabitants, and afterwards made parochial. It is a large cross church in the early English style, with a central tower. There are cotton mills in the neighbourhood, but the trade is not extensive. Population of the parish, 4927.

Chorley, a market-town, 9 miles S.S.E. from Preston, and 11 miles N.W. from Bolton, is a station on the Lancashire and Yorkshire Railway. The town stands on the summit of a hill, the base of which is watered by the Chor, a rivulet which flows into the Yarrow, about a mile below the town. The streets are wide and well built, and the town is well supplied with water. The chief articles of manufacture are calicoes, muslins, and ginghams. The Leeds and Liverpool Canal passes within a mile E. from the town. Coal and iron are abundant. There is a town-hall. The parish church is for the most part of Norman architecture, and there is also a modern church, as well as places of worship for various denominations of Dissenters. Population of the parish, 13,139.

Clitheroe, a market-town, municipal borough, and parliamentary borough, 30 miles N.N.W.

from Manchester. It is near the East Lancashire Railway. It returns one member to parliament. There is a Moot-Hall, a modern building of the gothic order, with a tall spire. Clitheroe Castle was dismantled by the Parliamentary Commissioners in 1649, and is now nearly demolished. The present church is an ancient structure, with a fine Saxon arch between the nave and choir. There are several chapels for Dissenters. There is a free grammar-school, founded by Queen Mary in 1554. The cotton trade is carried on to a considerable extent. The town is built of stone, and the streets are well paved. The municipal borough is governed by 4 aldermen and 12 councillors. Population of the township, 6765. Population of the parliamentary borough, 11,324.

Colne, a market-town, 18 miles N.E. from Blackburn, and 31 miles N. from Manchester. It is a station on the East Lancashire Railway. The town stands on a tongue of land formed by the river Calder and the Leeds and Liverpool Canal. The church is an ancient building. The chief manufacture of the place is cotton. The neighbourhood yields slate, coal, lime, and free-stone. There are several dissenting chapels. Population of the township, 8615.

Dalton, a small market-town, is 5 miles S.W. from Ulverstone. It is to be a station on the Furness Railway. The town consists of a principal street, which terminates in a spacious market-place. It was once the capital of Furness, but has long been superseded by Ulverstone. The church is a small neat building of considerable antiquity. The chief trade carried on is malting, and there are some iron-works near the town. Population of the parish, 3231.

Fleetwood-on-Wyre, a sea-port and watering-place, 18 miles N.W. from Preston, with which it is placed in connection by a railway. It stands at the mouth of the æstuary of the Wyre, on the western shore, and on the south side of Lancaster Bay. The town, harbour, docks, warehouses, and pier were planned under the auspices of Sir Hesketh Fleetwood, about the year 1836, on ground which before that time was little else than a rabbit-warren. A church, a splendid hotel, two shore light-houses, and other buildings have been constructed. It was expected that this port would attract a large amount of traffic to and from Belfast, Londonderry, Drogheda, and other Irish ports; and to and from Glasgow and Ardrossan; but Liverpool still commands nearly all the Irish traffic; while the opening of the Caledonian Railway has seriously interfered with the development of the trade between Fleetwood and the Scotch ports. The population in 1841 was 2833.

Garstang, a market-town, is 11 miles S. from Lancashire. It is a station on the Preston and Lancaster Railway. The streets are irregular, but are well paved and lighted. The parish church is about a mile and a half from the town. The Lancaster Canal crosses the Wyre by an aqueduct close by the town. There are cotton and calico printing establishments in the neighbourhood. Population of the township, 909.

Haslingden, a market-town, 18 miles N. by W. from Manchester by the East Lancashire Railway. The older part of the town, including the church, is on the declivity of a hill. The town is prosperous and improving, and contains many new buildings. The woollen manufacture is carried on; but the staple manufacture is cotton. The town contains a church, and there are several places of worship for Dissenters. Population of the township, 8063.

Hawkshead, a small market-town, 29 miles N.N.W. from Lancaster. It is near the terminus of the Windermere Railway. The church is an ancient structure. Population of the township, 892.

Kirkham, a market town, 9 miles W.N.W. from Preston. There is a branch railway to it from the Preston and Fleetwood Railway. It is small, but well built. The church was rebuilt in 1822; but the ancient tower of Norman architecture remains. There is a free grammar-school. Population of the township, 2903.

Lancaster, the capital of the county, is situated on the south bank of the river Lune, not far from its mouth. It is 22 miles N. by W. from Preston, and 229 miles from London by the Trent Valley Railway, or 238 by the Birmingham Railway. The Lancaster Canal extends from Preston to Kendal. Lancaster is a place of great antiquity. The castle is a spacious edifice, now used as a county gaol and court house. The large square keep is very strong. The Shire Hall and County Courts are modern. The streets of the town are for the most part narrow; the houses are built of free-stone. The church is on the same eminence as the castle: it is very spacious, and contains some specimens of screen-work; the tower is of modern erection. There are two chapels of ease, and some chapels for Dissenters. There are assembly-rooms and a theatre. A handsome stone bridge over the Lune, at the N.E. extremity of the town, connects it with the suburb of Skerton. There are several almshouses, and in the neighbourhood of the town is the County Lunatic Asylum. The port of Lancaster formerly had a considerable share of the West India trade, which is now in a great degree transferred to Liverpool; but it still possesses a portion of foreign commerce, and a considerable coasting trade. The number of sailing-vessels registered at the port on Dec. 31, 1847, was—under 50 tons, 40; above 50 tons, 49; and there were two small steam vessels. The cotton manufacture was introduced not many years ago into the town and neighbourhood, where it has considerably increased. The parliamentary borough returns two members; population, 14,389. The municipal borough is divided into 3 wards, and is governed by 6 aldermen and 18 councillors: population, 13,531.

Leigh is on the road from Newton to Bolton. It is a station on the Bolton and Kenyon branch of the London and North-Western Railway, 7 miles from Bolton. The townspeople are engaged in the manufacture of cambrics and fustians. There are collieries and stone quarries in the parish. Leigh communicates with Manchester by the Duke of Bridgewater's Canal, and with the Leeds and Liverpool Canal by a branch canal to Wigan. Population of the parish, 22,229.

Liverpool. [LIVERPOOL.]

Manchester. [MANCHESTER.]

Middleton is 6½ miles N. by E. from Manchester, near the river Irk, which flows into the Irwell. This town owes its prosperity to the cotton manufacture. The church is an ancient building, with a carved screen dividing the chancel from the choir. There are several dissenting places of worship. Population of the parish, 15,488.

Newton-in-Mackerfield is a small town, 5 miles N. from Warrington. It is a station on the Liverpool and Manchester branch of the North Western Railway, 15¾ miles from Liverpool. The place consists chiefly of one street; it has an ancient court-house, now used for a school. There is a market-cross, though the market has been long discontinued. Newton was disfranchised by the Reform Act. The chapel is a comparatively modern building. Population of the chapelry, 3126.

Oldham, a parliamentary borough, is six miles N.E. from Manchester. There is communication between the two towns by means of a branch of the Lancashire and Yorkshire Railway. The town is situated on an eminence, near the source of the Irk, and is on the western bank of a branch of the Medlock. Its rapid rise is mainly attributable to its being in the neighbourhood of extensive coal mines, which give employment to a large portion of its population, and to the great increase of cotton manufactures since the middle of the last century. The manufacture of fustians, cotton, and woollen and silk goods is very extensive; and there are more hats produced here than in any other part of England. Various improvements have been effected of late years in the town. A new church has been built, and gas and water works erected. Population of the township, 42,595. The parliamentary borough returns two members. Population, 60,109.

Ormskirk is 13 miles N. by E. from Liverpool. The town consists of four principal streets, which intersect each other at right angles. The church is mostly modern, with a few portions of late perpendicular character. Cotton and linen thread, silks, hats, and rope are manufactured here, but not extensively. Coals are dug in the parish. Population of the township, 4891.

Poulton is about 17 miles in a straight line S.S.W. from Lancaster. The Preston and Fleetwood Railway passes through Poulton. The town is about a mile from the æstuary of the Wyre. Population of the township, 1128.

Prescot is 8 miles E. from Liverpool. There are extensive collieries in the parish. Among the principal manufactures of the town are those of small files, and the movements and other parts of watches. The Liverpool and Manchester Railway passes near the town. The town consists principally of one long street. The church is ancient and large. Population of the township, 5451.

Preston. [PRESTON.]

Rochdale, a parliamentary borough, is 11 miles N.N.E. from Manchester. It is a station on the Lancashire and Yorkshire Railway. The parish is partly in the West Riding of Yorkshire. The town is situated on both sides of the river Roach, an affluent of the Irwell, and the different parts of the town are united by three bridges. The streets are for the most part irregularly laid out, but they are well paved and lighted, and have been considerably improved of late years. The town is well supplied with water. There are several churches and chapels, episcopal and dissenting. The parish church is partly in the early English style, with a few remains of Norman character in the interior. The manufactures are very important. In the time of Edward III. some Flemings introduced the woollen manufacture into the town; it has continued to flourish, and now forms its staple commodity. Calico, cotton yarn, and hats are also manufactured. Coal is dug, and slates, flagstone, and freestone are abundantly quarried in the parish; and there are also iron-works. Steam power is extensively employed by the manufacturers. The Rochdale Canal passes to the S.E. of the town. There is a neat town-hall, used also as a news-room, and a commodious gaol. Rochdale returns one member to parliament. Population of the parliamentary borough, 24,091.

St. Helens is 11¾ miles from Liverpool, by the Liverpool and Manchester branch of the North-Western Railway. The town rose into importance chiefly by means of the large establishment of the British Plate-Glass Company at Ravenhead, in the adjacent township of Sutton, and of the copper-works belonging to the proprietors of the Parys Mine, in Anglesey, who brought their ore here to be smelted. There is an episcopal chapel and some dissenting and Roman Catholic places of worship. The Sankey Canal passes near the town, and there is a railway from St. Helens to Runcorn Gap on the Mersey. Population of the township, 5051.

Salford. [MANCHESTER.]

Stockport. [STOCKPORT.]

Todmorden, a market-town, is 20 miles N.N.E. from Manchester. It is a station on the Leeds and Manchester (Lancashire and Yorkshire) Railway. The inhabitants are engaged in the cotton and woollen manufactures, both of which have greatly increased. There are two episcopal chapels, both of modern date. There are also several dissenting meeting-houses. The Rochdale Canal passes near the town. Population of the township, 3928.

Ulverstone is about 5 miles N.E. from Dalton, a station on the Furness Railway—from which point an act has been obtained for a branch to Ulverstone. There are slate-quarries in several parts of the parish. The town is pleasantly situated on a declivity sloping to the south, about a mile from the sands on the æstuary of the Leven. It consists of four principal streets, spacious and clean; the houses are chiefly built of stone. There are a theatre, assembly-room, and subscription library. The church, a plain neat structure, has been almost entirely rebuilt in the present century; the tower and a Norman doorway remain of the old church. There are several dissenting meeting houses. There are some manufactures of cottons and coarse linens. A canal from the æstuary of the Leven enables large vessels to come up and discharge their cargoes in a spacious basin, almost

close to the town, from which there is a considerable export of iron-ore, iron, slates, and other articles. Some ship-building is carried on. Population of the township, 5352.

Warrington, a parliamentary borough, is 18 miles E. from Liverpool, or 21 miles by the London and North-Western Railway. The town is on the north bank of the Mersey, which is crossed by a wooden bridge built upon stone piers. The town is composed of numerous streets, many of which are narrow and irregularly laid out; but they are well paved, and lighted with gas. Some of the houses are handsome and modern. The parish church is east from the town. It is a large cruciform building of various dates. There are 5 episcopal churches or chapels in the parish, two of which are in the town itself. There are several places of worship for Dissenters. Besides these buildings there are—a town-hall, a market-hall, two cloth-halls, a bridewell, assembly-rooms, and a theatre. The principal branches of industry in Warrington are cotton-spinning, the manufacture of flint-glass and glass bottles, machinery and mill work, and many branches of iron manufactures. There are steam flour-mills, tanyards, malt-houses, one or more paper-mills, and several breweries. The Mersey is navigable at spring tides up to Warrington for vessels of from 70 to 100 tons. The Mersey and Irwell Canal joins the Mersey near Warrington; and the Sankey Canal and the Duke of Bridgewater's Canal both pass near the town. Warrington returns one member. Population of the parliamentary borough, 21,116; of the township, 18,981.

Wigan, a market-town, parliamentary borough, and municipal borough, is 12 miles N. from Warrington, and 18 miles W.N.W. from Manchester. It is a station on the London and North-Western Railway. The town is of considerable antiquity. The old streets are irregularly built; but the new ones, near the river Douglas, have many good houses. From its situation on the Lancashire coal-field, the population of the borough has increased with the development of manufacturing industry. The manufactures of the place comprise linens, calico, checks, fustians, the spinning of cotton yarn, and other branches of the cotton manufacture. The Leeds and Liverpool Canal passes through the town. The parish church is a very handsome structure. The Roman Catholics have two chapels, and there are several dissenting places of worship. There is a town-hall, commercial hall, a dispensary, a savings' bank, and a mechanics' institution. The municipal borough is divided into 5 wards, and is governed by 10 aldermen and 30 councillors. Population of the borough and township, 25,517. The parliamentary borough, which returns two members, is coincident with the municipal borough.

History and Antiquities.—In the earliest period of English history this county was inhabited chiefly by the Brigantes (*Βρίγαντις*, Ptolemæus), the most numerous and powerful of the tribes which then possessed the island. They were subdued by Agricola. Many of the stations mentioned by Ptolemæus and other geographers have been identified with existing towns. Several Roman roads have been traced in this county. Six of them diverge from Manchester (Mancunium) as a co mon centre.

Long after the invasion of the Saxons, La cashire, the northern part at least, retained independence as a part of the British State Cumbria, or Cumberland, though this was fr quently obliged to own the supremacy of t Northumbrian Angles. Egfrid, the son of Osw who reigned over the Northumbrians A.D. 67 685, conquered a part of the county. Wheth Lancashire or any part of it was permanent brought into subjection by the Saxons before t submission of the Cumbrian Britons to Edwa the Elder, in A.D. 921, is not known.

In A.D. 1323 the northern part of the coun was ravaged by the Scots under Robert Bruc In the reign of Henry VII., the Earl of Linco and Lord Lovel landed in Furness, to support t cause of the impostor Lambert Simnel. In t civil war of Charles I. many contests took pla in various parts of the county.

There are few castellated remains in the count The monastic ruins are of greater interest. Furne Abbey is near Dalton in Furness, on the banks a rivulet in a narrow and fertile vale. The ruin of this abbey are still magnificent, and, from th seclusion and picturesque beauty of the surroun ing scenery, are among the most striking of o monastic remains. They are of Norman a early English character. There are remains the church, the chapter-house, the cloisters, t school-house, and other buildings. Whall Abbey and the Priory church of Cartmel are tw other monastic ruins.

LANCASTER. [LANCASHIRE.]

LANCASTER, COUNTY PALATINE O [PALATINE COUNTIES.]

LANCASTER, DUCHY OF. [CIVIL LIS

LANCASTER, SIR JAMES, a skilful s man, who conducted the first voyage undertak by the East India Company, A.D. 1600–3; a established commercial relations with the prin of Acheen in Sumatra, and Bantam in Java. was a firm believer in a north-west passage; a Lancaster's Sound, a deep inlet in Baffin's Ba 74° N. lat., was named after him. Accounts Sir J. Lancaster's voyages in 1591 and 1594 a given in Hakluyt's 'Voyages,' vol. iii.: his voya to the East Indies in 1600–3 is contained Purchas's 'Pilgrims,' vol. i. He died in 1620.

LANCELET. [BRANCHIOSTOMA.]

LANCE'OLA, a genus of Crustaceans es blished by Mr. Say on a species, *Lanceola pelagi* two females of which only he appears to ha seen taken on the coast of America, in the G Stream. M. Desmarest is of opinion that t genus belongs to the order *Amphipoda*.

LAND, in English law, in its most restric signification is confined to arable ground. In t sense the term is construed in original writs, a in this sense it is used in all correct and for pleadings.

By the Statute of Wills, 1 Vict. c. 26, s. 2 devise of the land of the testator generally, o the land of the testator in any place or in the cupation of any person mentioned in the will to be construed to include customary, copyh

and leasehold estates, to which the description will extend, as well as freehold estates, unless a contrary intention appear by the will. In its more wide legal signification, land includes meadow, pasture, woods, moors, waters, &c.; but in this wider sense the word generally used is lands: the term land or lands is taken in this larger sense in conveyances and contracts.

A conveyance of land includes all that is attached to the land and all that is under it. Ownership of land and all estates in land, except chattel interests, are included in the term *real* property, in contradistinction to *personal* property, which consists in money, goods, and other moveables. Land held for a number of years or other determinate time is a chattel interest, but it is distinguished from other chattels by the name of Chattels Real. [CHATTELS.]

Land Derelict, or left dry by the sudden receding of the sea, or of the water of a navigable river, belongs to the king by his prerogative. Land formed by alluvion, that is, by gradual imperceptible receding of any water, or by a gradual deposit on the shore, accrues to the owner of the adjoining land. The rules of English law as to Alluvion, as stated in Bracton (fol. 9), are chiefly copied from the 'Digest' (41 tit. i. s. 7).

LAND. The first inquiry which a man would make at the present day, who wished to cultivate the land in any country, would be, on what terms he could have the ownership or the use of it. If he wished to purchase, he would inquire if he could easily get a good title and a cheap conveyance of the land. His next inquiry would be, what charges or payments he would be liable to in respect of his ownership of the land. His choice of a locality would, in a great degree, depend on the facilities of roads or water communications, for carrying his surplus produce to a market. If he were a settler in a new country, he might be content with a good piece of land, if there were no market near him. He might be able to live in a way until the neighbourhood were better settled, roads made or improved, and towns sprung up in the vicinity. He would be repaid for some years of suffering and privation, by the lower cost of land which is not situated favourably for markets at the time when it is purchased. A man who settles in a new country wishes to become the owner of the land which he cultivates; and the obtaining of land is one strong motive which drives a man from an old country, where it is got with great difficulty, to encounter the labour and privation which accompany all settlements in new countries.

Great Britain possesses immense tracts of land in her foreign possessions. The United States of North America have disposed of enormous quantities of public land, and have still much to sell. These are the only two governments in the world which have large quantities of waste, that is, uncultivated, land to dispose of; and every man who wishes to settle abroad has the choice between these two markets. There is no doubt that the land of the United States attracts the greater number, because the title is clear, the cost of the land small, and the taxes are next to nothing. But there are many parts of the British foreign possessions which offer natural advantages of soil and climate, of greater variety, and equal or superior to what the United States have to offer. Yet these natural advantages are more than counterbalanced by our system of colonial management, by insecurity of title in some places, New Zealand for instance, unreasonable price in other places, where more is asked for land than it is worth, and by the general system of colonial government, which subjects the settler to many disadvantages and to some grievances from which he is secured by a settlement within the United States of North America.

In England a large extent of land is devoted to the religious purposes of the established church, and it is inalienable; a large extent belongs to charities, and is inalienable also. The whole amount in the hands of corporate bodies, and of trustees, which cannot be sold, is very large. Further, a great part of the land of England is held by a comparatively small number of proprietors, who, by a series of settlements, contrive to keep the property in their family as long as they can. When land is sold, the expense of investigating a title and of conveyance are a serious diminution of its value; a diminution, however, which mainly affects the seller, though the buyer comes in for a share of the loss; for the competition for land doubtless raises its price in the market; and, though a simpler title and a cheaper conveyance would improve the value of land as an article of sale, yet, if more of it could be brought into the market, the effect of competition in raising its price would be somewhat diminished.

If the investigation of a title to land could be simplified, one great source of expense in the transfer of land, and some litigation arising out of contracts, would be much diminished; and there would then only remain the taxes levied in the form of stamps,—a kind of taxation which, in an old country burdened with a huge public debt, could not be entirely taken away. Yet the stamp might be diminished without loss to the revenue, if sales of land were increased. As to the mere conveyance of land, it is simple and easy enough, and need not cost much, if a man wants no more than a conveyance in fee-simple. But if he wishes to settle his purchased land, as it is termed, to secure its devolution in his family, so far as the law gives him the power, the conveyance to him becomes a very complicated kind of instrument, sufficiently expensive in itself, and the foundation of future expense and cost.

It is not very likely that the present system in England will very soon be changed so as to diminish the amount of land held by large proprietors, and to bring much of it into the market, though this occurs occasionally from the embarrassed circumstances of proprietors, and may perhaps reasonably be expected to occur in future years oftener than it has done. But, when lands are sold, it is not every cultivator who has money to purchase with. One advantage that might follow from land being more abundant in the market would be, that many men who have capital might be disposed to bring up a son to

agriculture instead of to some profession, and might give him as his portion a small estate. There are many moneyed men who might find it better to do this than to embark a youth in an expensive profession, where success is uncertain and always remote; and such an outlay as would purchase a farm for a youth would be at least as prudent a provision as to send him to the colonies to try his fortune. It is undoubtedly a great drawback to the improvement of British agriculture, that there is not the opportunity of finding land in the market so freely as to render agriculture a pursuit to be looked to as one of the means of providing for a well-educated youth.

Time and circumstances which, unseen and unfelt, operate great changes, may render land more of a marketable commodity in England. Yet, as the whole extent of land is limited, and as there are moneyed men who are always eager to possess it, even at a price which offers a very moderate return for the outlay, it is probable that a large part of the land in England, if it should change hands, would still be purchased by wealthy capitalists; and it must be bought solely by them when it is sold only in large masses. Scattered purchases here and there do not suit the taste of a man who wishes to round in some thousands of acres, and to plant them himself, with a mansion and a park in the middle of them: and these are the opportunities which men of moderate means have for purchasing land.

Under any circumstances, it is probable that the great mass of land in England held by private persons will continue to be cultivated by tenants; and in the case of church lands, and other lands held in mortmain, it cannot be otherwise. The effect of the repeal of the corn laws will probably be a diminution of rent, and the rates and taxes imposed on land, if they should increase, must have the same effect. The great competition for land among lessees has no doubt contributed to maintain rents at a higher rate than is consistent with the interest of the cultivator. The cultivator who has capital has to choose between getting the use of land on such terms as he can in England, or emigrating to the United States of America or to British colonies. He has hardly the choice left of abandoning the cultivation of the land for some other occupation in England, for the change from agriculture to another business is not easy.

It concerns the interest, then, of all cultivators that they should be able to obtain the use of land in England on the terms of a fair lease, or should have the opportunity of getting lands in any British colony on easy terms. The land which England has in foreign parts should be viewed for all practical purposes as so much land added to our island, and merely separated by an interval of water. Perhaps there is not much objection to the terms on which land can now be got in the British colonies of North America, but in some other colonies the price is fixed too high; and in New Zealand, a new colony, which offers considerable advantages, it is said that the question of land titles, and the difficulty attending them, have been the chief cause of the disasters of that colony. With a fair field before them in th colonies, British agriculturists, or such of them a have capital and are enterprising, might prefer to tr their fortunes abroad to holding land on such term as those by which English lessees now often hold i The question which circumstances may compel great number of farmers to decide should be this a lease in England on such terms as will giv security against intimidation and compulsion t vote, a fair return for capital and skill, a lease u incumbered with vexatious covenants, and lan cleared from the devastation of game; or a piec of freehold in another country, with hardshi and privation for a few years, and the reasonabl prospect of after-plenty and repose. [Lease.]

LAND-CRAB. [Gecarcinus.]

LAND-TAX. [Taxation.]

LANDAU, a town in the Bavarian circle o the Rhine, important on account of its fortifica tions, which were constructed by Vauban, i situated in a beautiful valley on the river Queich and on a canal, by which provisions, material for building, &c., are conveyed to it by water The barracks and casemates are bomb-proof. Th town is very regularly built within, has two gate a large parade, a gymnasium, and manufactures o calico, woollens, linen, hats, and fire-arms; coppe and iron-foundries, &c. The population amount to rather more than 6000, besides the garrison Landau is one of the fortresses of the German Con federation.

LANDEN, JAMES, a mathematician, wa born at Peakirk, near Peterborough, in Jan. 171 and died at Melton, Jan. 1790. He was f many years agent to Earl Fitzwilliam. He best known by his attempt to derive the differe tial calculus from algebraical principles, ofte called his residual analysis. The writings of La den, besides those in the 'Philosophical Transa tions,' are — his 'Mathematical Lucubrations 1755; the 'Residual Analysis,' 1764; two v lumes of Memoirs; and Tracts on Convergi Series, 1781-82-83.

LANDER. [Quorra.]

LANDERNAU. [Finiste're.]

LANDES, a department in the south-west France, takes its name from the French wo *landes*, by which the vast sandy plains that exte between the Garonne and the Adour from t meridian of Greenwich to the Bay of Biscay a designated. The department is bounded N. Gironde, E. by Lot-et-Garonne and Gers, S. Basses-Pyrénées, and W. by the Bay of Biscay It extends from 43° 30′ to 44° 28′ N. lat., 0° E. to 1° 31′ W. long. Its greatest length from to W. is 72 miles, and from N. to S. 66 mil The area is 3533 square miles. The populati by the census of 1846, was 298,220; which gi 84.409 to the square mile, or 89.341 below t average per square mile for all France.

The lower slopes of the Pyrenees enter the so and south-east of the department, furrowed many brawling rivers, and subsiding into r plains that extend along the left bank of Midouze and the Adour, which rivers form general southern boundary of the landes. To northward of these rivers, the surface of

ground is covered with a loose ashen-gray sand, overgrown here and there with heath and furze, or covered with pine woods. Numerous flocks of wretched half-starved sheep wander over this desert waste, tended by shepherds who walk on high stilts to enable them to pass dry-footed over the marshes that occur in all directions. Clothed in sheep-skins, perched on his lofty stilts, and seated on a high staff with a flat broad end, the shepherd of the landes watching his sheep, and knitting woollen stockings, his constant occupation, presents to the stranger unprepared for the sight an extraordinary appearance. Not only the shepherds, but the charcoal-burners, and almost all the scanty population of the landes, are accustomed to the use of stilts, on which they walk with astonishing rapidity. Maize and barley are grown in favourable situations in this district; but the most important produce of the landes are the pine forests which cover nearly one-fourth of the surface, and which, besides the value of the timber, and the great quantity of rosin they are made to yield by tapping, are found to present a most effectual barrier to the sand hills along the west coast that formerly rolled into the interior under the influence of the western winds, and overwhelmed the villages and crops exposed to their course. The surface of the landes is rather elevated, as is proved by the rapidity of the river-streams which flow from them towards the south, west, and north-west: the largest of these is the Leyre, which flows N.W. into the Bay of Arcachon. The chief rivers of the department are the ADOUR, which receives numerous feeders from the Pyrenees on the left bank; and its principal tributary from the right bank, the Midouze. [GERS.]

Along the sea-coast of the department, which extends N. and S. about 70 miles, a marked feature of the country are the sand-hills, which have a width from E. to W. of 5 miles; their height ranges from 120 to 170 feet; they slope towards the sea at an angle of 25°, towards the land at an angle of 50°. The form of these masses of sand is continually varying; sometimes they are arranged in regular chains, at others they present a level surface; and not unfrequently they assume the form of isolated heaps, the openings between them being called *Lettes*. The rate of advance of these moving sands is said to be 65 feet yearly. To landward of them there are in some places rich pasture lands. There are several shallow inlets and some isolated lagunes along the coast; and all through the landes there are numerous marshes, the exhalations from which render the climate foggy in winter, and always more or less unhealthy. The marshes which formerly lined the banks of the Adour have been almost entirely converted into most productive land.

The department contains 2,261,439 acres, distributed among 40,549 proprietors, and into 655,775 parcels. Of this area, 968,967 acres consist of barren sands and moors; 415,261 are arable land; 654,190 acres are covered with woods and forests; 51,101 acres are under vine culture; 65,728 consist of grass land. The products, most of which are raised in the territory of *Chalosse*, as the country south of the Adour is called, are—wheat, maize, millet, hemp, flax, madder, saffron, &c. About 10,000,000 gallons of wine are produced annually, of which about a third goes to supply the home consumption; the rest is exported, or distilled and sold as Armagnac brandy. Almonds, plums, and fruits of all kinds, are abundant and excellent. Cattle are of inferior breed, ill-fed, and give milk of the poorest quality; the horses are small; sheep are numerous, but their wool is the worst possible; goats, pigs, poultry, and bees are numerous; game and fish are plentiful. Besides the pine, which grows most luxuriantly in the landes, the forest-timber consists of oak, cork, chestnut, and beech.

Mines of iron and bitumen are worked; mica, coal, marble, granite, lithographic stone, chalk, ochre, potters' clay of superior quality, crucible earth, &c., are found. Peat fuel is dug. Mineral springs are numerous.

The industrial produce is composed of coarse woollens, pottery, liqueurs, bar iron and ironware, rosin, pitch, tar, glass, paper, leather, brandy, beer, oil, &c. There is also a considerable trade in timber, deals, linseed-oil, fruits, wool, pork, &c. The number of wind and water mills amounts to 762, of iron-foundries and smelting furnaces to 31, of factories and workshops of different kinds to 351. About 135 fairs are held annually. The department is crossed by 7 royal and 11 departmental roads.

The department is divided into 3 arrondissements, which, with their subdivisions and population, are as follows:—

Arronds.	Cantons.	Communes.	Pop. in 1846.
Mont-de-Marsan . . .	12	133	99,263
St.-Sever . .	8	102	90,540
Dax	8	113	108,415
Total . .	28	348	298,220

Of the arrondissement of Mont-de-Marsan and of the whole department the capital is *Mont-de-Marsan*, which stands in 45° 53′ N. lat., 0° 30′ W. long., 65 miles S. from Bordeaux, and nearly the same distance N.E. from Bayonne. The town, though small, and with a population of only 4465, presents a thriving appearance, and its situation at the junction of the Midou and the Douze, which form the Midouze, a navigable feeder of the Adour, give it considerable advantages in the way of commerce. The streets are wide and well-built, and there are several fine avenues of ancient oaks leading into the town. The principal structures are the prefect's residence, the court-house, prison, the hospital, and barracks. The town is the seat of a tribunal of first instance, and has a college, public library of 12,000 volumes, a theatre, and several public baths. Cloth, blankets, sailcloth, and leather are the principal manufactures. Mont-de-Marsan has communication with the Garonne by the Canal des Landes, which at Lavardac joins the Baise, a navigable feeder of the Garonne. The most important commerce of the

town consists in the transport of the wines and brandies of Armagnac by the Midouze and the Adour for shipment at Bayonne. In time of war with England, Mont-de-Marsan becomes an important entrepôt between Bayonne and Bordeaux. *Pissos*, near the Leyre, has potteries, iron-works, and 2066 inhabitants. *Roquefort*, at the junction of the Estampon with the Douze, has a population of 1721. *Sabres*, a town of 2524 inhabitants, stands on the Leyre in the midst of barren wastes and marshes, and has a very handsome church said to have been built by the Templars. *Sore*, in a good wine district in the middle of landes N. of Mont-de-Marsan, has potteries, glass-works, and 1740 inhabitants, who also raise vast quantities of turf for fuel.

In the arrondissement of St.-Sever, the chief town, *St.-Sever*, is situated in an extremely fertile district on the left bank of the Adour, 10 miles S. from Mont-de-Marsan, and has a tribunal of first instance, a college, and 5238 inhabitants, who manufacture fine pottery, linseed-oil, and leather, and trade in corn, wine, brandy, mineral waters, marble, cut stone, plaster, &c. The town is well built, and contains some handsome buildings; among which must be named the court-house, the hospital, barracks, prison, and a magnificent church, which formerly made part of the Abbey of St.-Sever. *Aire*, an episcopal and ancient city, stands on the slope of a hill on the left bank of the Adour, which is here crossed by a handsome stone bridge, 17 miles E. from St.-Sever, and contains an ecclesiastical college, a very ancient church, and 4432 inhabitants. The town, which is neat and well built, has manufactures of hats and leather. *Amou*, a pretty little town of 2176 inhabitants, is situated in a very fertile corn and wine country near the junction of the Luy-de-France with the Luy-de-Béarn, and has potteries, brandy distilleries, tile works, and numerous flour, oil, and bark mills. *Hagetmau*, a town of 3081 inhabitants, stands in a district abounding with game, on the Louts, a few miles S. by W. from St.-Sever, and has manufactures of household linen, pottery, leather, and several oil-mills. It has also a good trade in wine, corn, maize, flax, chestnuts, hides, and cattle. Great quantities of oak-staves and hoops are despatched to Bordeaux. *Mugron*, situated at the foot of a hill on the left bank of the Adour, has 2190 inhabitants, who trade in brandy, wine, rosin, and silk. *Tartas*, W. by N. from St. Sever, is a well-built ancient town prettily situated on the Midouze, and has 2759 inhabitants, who manufacture linseed oil, vinegar, and leather, and trade largely in corn, wine, brandy, saffron (of which a great deal is grown in the neighbourhood), fruits, game, hams, timber, planks, rosin, &c.

In the arrondissement of Dax, the chief town, *Dax*, situated in a fertile plain on the left bank of the Adour, over which there is a bridge to the suburb of Sablar, is a well-built town, surrounded by ramparts and fosses of Roman construction, 30 miles S.W. from Mont-de-Marsan, and has 5842 inhabitants. The town, which is entered by three gates, is defended by a strong castle. The chief buildings are—the former episcopal palace, now occupied by the sub-prefect and the mayor, th court-house, the cathedral, and the gaol. Dax ha a tribunal of first instance, a college, and a cons derable commerce in liqueurs, wine, corn, hams onions, timber, deals, rosin, &c. It has bee famous from the most ancient times for its ho mineral springs, whence its ancient name of *Aqua* of which Dax (d'Acqs) is a corruption. Aquæ o Aquæ Tarbellicæ was the capital of the Tarbell a people of Aquitania. *St.-Esprit*, in the south western extremity of the department, and on th right bank of the Adour, here crossed by a lon wooden bridge which joins the town to Bayonn is a large busy town, with a population of 7324 by far the greater part of whom are descendants o Jewish refugees from Spain. The citadel of St.-Es prit, constructed by Vauban, commands the town o Bayonne, and the approaches to it by land and sea [Bayonne.] The Jews have 3 synagogues here, i one of which a Rabbi preaches every Saturday i Spanish. *Peyrehorade*, on the right bank of th Gave-de-Pau, which here becomes navigable an a few miles lower down enters the Adour, ha 2742 inhabitants. It has a fine old castle flanke with towers. Large stores of ship-timber from th forests of the Pyrenees are kept here; there ar also important quarries in the neighbourhood *Soustons*, on the eastern shore of the lagune o Soustons, 17 miles W. from Dax, has a populatio of 2783.

The department forms the see of the Bishop o Aire, is comprised in the jurisdiction of the Cou Royale and of the University Academy of Pau, an belongs to the 20th Military Division, of whic Bayonne is head-quarters. It returned 3 membe to the Chamber of Deputies; it now has 7 repr sentatives in the National Assembly.

(*Dictionnaire de la France; Annuaire pou l'An* 1849; *Statistique de la France.*)

LANDING-WAITER, an officer of the cu toms whose duties consist in taking an accura account of the number, weight, measure, or quali of the various descriptions of merchandise land from foreign countries or colonial possessio Landing-waiters likewise attend to the shipme of all goods in respect of which bounties or dra backs are claimed. These officers are likewi called Searchers.

LANDRECIES. [Nord.]

LANDSBERG. [Brandenberg.]

LANDSCRONA. [Sweden.]

LANDSHUT, a pretty town in Bavaria, wi 9000 inhabitants, is situated on the Isar, whi is here crossed by two bridges. The princi portion of the town consists of two long broad a straight streets, connected by a number of narrow ones. The houses are well built of brick, a many of them have gardens. The most rema able buildings are—the palace, the house of t provincial assemby, an hospital, and two pa churches, of which St. Martin's is celebrated its beautiful steeple, 450 feet in height, a commanding a magnificent view over almost whole plain of Bavaria. On a mountain near town is the ancient castle of Trausnitz, which w formerly a strong fortress, and the residence the dukes of Bavaria. In the year 1800

university of Ingolstadt was transferred to Landshut; but in 1826 it was removed to Munich. There are however still a theological college, a gymnasium, a lyceum, and a school of surgery. There are extensive breweries and distilleries in the town.

LANDIVISIAU. [FINISTE'RE.]

LANFRANC, Archbishop of Canterbury, was born at Pavia, A.D. 1005. He spent some years in the study of rhetoric and civil law at Bologna, and he afterwards became Prior of the Abbey of Bec. William, duke of Normandy, made him one of his counsellors, employed him in an important embassy to the Pope, appointed him, A.D. 1062, abbot of his newly erected monastery of St. Stephen at Caen, and eventually procured his election, Aug. 15, 1070, to the see of Canterbury, the cathedral of which Lanfranc rebuilt. He died May 28, 1089.

His writings consist of commentaries on St. Paul's Epistles, sermons, letters, and his treatise on the Eucharist against Berenger. His works were collected and edited by Lucas d'Achery, at Paris, folio, 1648.

LANGBAINE, GERARD, D.D., born in Westmorland about 1608, was successively a servitor, scholar, fellow, and provost of Queen's College, Oxford. He edited Longinus; but he is chiefly deserving of notice on account of his unprinted collections, which included several catalogues of manuscripts, often referred to by Warton and others. He died in 1658.

Gerard Langbaine, his son, was born at Oxford in 1656, and apprenticed to a bookseller in London. In 1672 he was entered a gentleman commoner of University College. He made a large collection of old plays, amounting to almost a thousand, from which, after having used them in other catalogues, he produced his 'Account of the English Dramatick Poets,' 1691, 8vo., 1699 (by Gildon), 1719 (by Giles Jacob, for Curl). The criticism contained in this work is shallow; but, in relating facts and describing editions, he scrupulously sets down what was before him; and, although the information is incomplete, his work is the most trustworthy of our catalogues of the kind. In the British Museum is a copy of it with notes by Oldys. He died in June 1692.

LANGEAIS. [INDRE-ET-LOIRE.]

LANGHOLM. [DUMFRIESSHIRE.]

LANGHORNE, JOHN, was born at Kirkby Stephen, in Westmorland, in 1735, and educated at the school of Appleby. He afterwards received private tuition, and took orders, and in 1760 entered himself at Clare Hall, Cambridge. He obtained a curacy in London, and helped to support himself by his pen. Dr. Hurd appointed him assistant preacher of Lincoln's Inn Fields, and a short poem, called 'Genius and Valour,' procured for him, from the University of Edinburgh in 1766, the degree of D.D. He undertook, with his brother, the translation of Plutarch's 'Lives,' which was published in 1771. He was twice married. He died in April 1779. His Poems were published by his son in 1802, with a Life of the author.

LANGON. [GIRONDE.]

LANGRES, a town in the French department of Haute-Marne, which takes its name from the *Lingones*, an ancient Celtic tribe whose capital it was, is situated in 47° 51′ 53″ N. lat., 5° 19′ 55″ E. long., at a distance of 158 miles S.E. from Paris, and has 8303 inhabitants. The town, built on the watershed between the Mediterranean and the Atlantic, near the sources of the Marne, the Meuse, the Amance, and the Vingeanne, occupies a higher site than any other town in France, except Briançon. It is surrounded by old walls, and is pretty well built, with wide streets, and is ornamented with fountains and promenades. The most remarkable structures are—the cathedral, part of which dates from the year 380, the town-hall, and a Roman triumphal arch, which makes part of the town wall. The greatest ornament of the town is the promenade called Blanche-Fontaine, which is formed of an avenue of magnificent limes, nearly a mile in length, and terminates in a majestic vaulted arcade, from the top of which a colossal frog in bronze continually spouts a mass of limpid water that feeds several basins and jets. The public library of 7000 volumes is in the town-hall: there is a museum in the old church of St.-Didier. The chief manufacture of Langres is cutlery; there is also a considerable trade in corn, flour, wine, flax, hemp, wool, &c. The town, which gives title to a bishop, is the seat of tribunals of first instance and of commerce; it has two ecclesiastical schools, a college, and three hospitals. A great number of Roman antiquities have been found near Langres.

LANGTOFT, PETER, who lived at the end of the 13th and beginning of the 14th century, was a canon-regular of the order of St. Austin at Bridlington in Yorkshire. He compiled, in French verse, a 'Chronicle of England,' manuscripts of which are preserved in the Cottonian Collection in the British Museum, and in the library of the Heralds' College, London. Robert de Brunne made an English metrical version of Langtoft's 'Chronicle,' which was edited at Oxford, in 2 vols. 8vo., by Hearne, in 1725.

LANGTON, STEPHEN, was a native of England, and was born in the earlier half of the 12th century. After finishing his studies at the university of Paris, he rose to the office of its chancellor. Langton was consecrated Archbishop of Canterbury by Innocent III. at Viterbo, June 17, 1207. It was he who, at the meeting of the heads of the revolt at London, August 25, 1213, suggested the demand for a renewal of the Charter of Henry I. He continued to preside over the Church till his death, July 9, 1228.

LANGUAGE. The origin of language, like that of man himself, is unknown, beyond the brief statement in the book of Genesis. That man has the faculty of speech is only another mode of saying that by his nature he is qualified to produce all the sounds which compose spoken language. Whether man gradually formed language, stimulated by his instincts for social life, and guided by his intellectual powers; or whether language, and not the bare faculty of speech, was conferred on him by the same power which called him into being, are questions that cannot be

course that subsisted between the inhabitants of India and the Western nations precludes the supposition that one nation could have derived its language from the other; and indeed the resemblance is so striking, and descends to such minute particulars, that nothing but a common origin is sufficient to account for their similarity. The error we have been attempting to combat is very general, and nothing is more common than to hear a certain class of etymologists speak of a number of English words as derived from the Latin and Greek, which are in fact the common property of many tongues. Many English words, such as *inspect, corporate, communicate, detriment*, are doubtless derived from the Latin, while others, such as *astronomy, geography, geology*, have been borrowed directly from the Greek, or manufactured according to settled analogies; but such words as *know, lick, break, yoke, sit*, and numerous others, are common to the English, Sanskrit, Latin, Greek, and Slavonic tongues; and it might be said, with as much truth, that the Sanskrit *jnā*, or the Greek γι-γνώ-σκω, are derived from the English *know*, as that the English word comes from the Latin.

The mode in which cognate languages ought to be examined and compared, such as the Sanskrit, Greek, Latin, and others, is shown at some length in the 'Penny Cyclopædia' (article 'Language'), by numerous examples. The remarks under the different letters of the alphabet, A, B, C, &c., will also show in what manner the forms of words in cognate languages should be compared.

The affinity of languages may be shown by comparing any languages that are related; but the comparison of the languages called Indo-Germanic is the most useful for the purpose. Numerous examples may be found in Bopp's *Vergleichende Grammatik;* Pott's *Etymologische Forschungen;* Prichard's *Eastern Origin of the Celtic Nations, &c.;* Grimm's *Teutonic Grammar;* and Winning's *Manual of Comparative Philology.*

LANGUE D'OC. [LANGUEDOC.]

LANGUEDOC, an old province of France, which now forms the departments of AUDE, TARN, HE'RAULT, LOZE'RE, ARDE'CHE, and GARD, together with the arrondissements of Toulouse and Villefranche in HAUTE-GARONNE, Castel-Sarrasin in TARN-ET-GARONNE, and Puy and Yssengeaux in HAUTE-LOIRE. Under the Romans it formed part of Gallia Narbonensis, and on the decline of their power it had the name of Septimania, from its seven bishoprics, viz. Toulouse, Béziers, Nimes, Agde, Maguelonne, Lodève, and Uzès. The Emperor Honorius ceded the territory of Languedoc to the Goths, who held it for nearly two hundred years, when they were driven out by the Saracens, who, in their turn, were expelled by Charles Martel. The country thus subjected to the kings of France was governed by feudatory dukes and counts till 1270, when, on the death of the last Count of Toulouse, it was united to the crown of France.

The name Languedoc has been transferred to the country from the name given to the language of the inhabitants, who used the word *oc* as an affirmative, and were hence said to speak the *langue d'oc*, as distinguished from the dialect spoken north of the Loire, which expressed the affirmative by *oui*, and was called the *langue d'oui*. The name *Occitania*, sometimes applied to the country, is said to be derived also from *oc*.

The province extended from the Rhône to the Garonne, the most western point reaching the junction of the Tarn with the last-mentioned river. It was bounded N. by Auvergne and Lyonnais, E. by Dauphiné and Provence, S. by Roussillon and the Mediterranean, and W. by Guienne and Gascoigne. It was formerly divided into Haut-Languedoc, Bas-Languedoc, and Cévennes, which had Toulouse, Montpellier, and Alais for their capitals respectively.

LANIADÆ. [SHRIKES.]

LANIERE, NICOLAS, a painter, engraver, and musician, was a favourite with Charles I. He was an Italian, born in 1568. Laniere was employed by Charles to purchase pictures for him, and Walpole supposes he was employed in the purchase of the gallery of the Duke of Mantua, for which Charles gave 20,000*l*.

Laniere was a better musician than a painter. He was appointed in 1626 Charles's chapel-master, for which he had a salary of 200*l*. per annum: he was also closet-keeper to Charles. He painted the scenes and composed the music for one of Ben Jonson's masques, in 1617. He also set to music the hymn which was written by Thomas Pierce for the funeral dirge of Charles I.

Laniere lived to see the dispersion of the collection which he himself had been mainly instrumental in forming. The time of his death is uncertain.

LANNES, JEAN, Duke of Montebello and Marshal of France, was born at Lectoure in Guienne, on April 11, 1769. He was born of humble parents, and brought up to the trade of a dyer, which he quitted in 1792 to join a battalion of volunteers raised in the department of Gers, of which he soon became sergeant-major. He rose so rapidly, that at the close of the year 1793 he had attained the rank of 'chef de brigade.' In 1794 he made the acquaintance of Bonaparte, under whom he afterwards served in Italy. After the victories of Montenotte and Millesimo in April 1796, he was raised to the rank of general, and in 1797 became general of brigade; in which capacity he served till the signing of the treaty of Campo Formio. He afterwards formed part of the expedition to Egypt, where he rose to the rank of a general of division, and maintained his high reputation. He was dangerously wounded at the siege of Acre, and he greatly contributed to the victory gained by the French at Aboukir.

When Bonaparte determined upon leaving Egypt, Lannes returned with him, and rendered him material assistance in the revolution of the 18th Brumaire (November 9), 1799. In the year 1800 he served in the expedition to Italy, and shared the dangers and labour which the French army underwent in crossing the Great St. Bernard. In this campaign he particularly distinguished himself at the battles of Montebello and Marengo.

In 1801 he was sent to Lisbon by the First

Consul in the capacity of minister plenipotentiary of France, and he extorted from the feeble Portuguese government every measure that Napoleon required. On his return in 1804, Napoleon, who was now emperor, created him Marshal of the Empire, and afterwards Duke of Montebello. In the Austrian campaign of 1805 Lannes was appointed to the chief command of the left wing of the French army, and in the battle of Austerlitz, December 2, 1805, gave proof of increased skill and judgment.

In the Prussian campaign of 1806 and 1807 he performed many brilliant achievements: and in 1808 he accompanied Napoleon in the Peninsular campaign, and had the command of the third corps of the army, and defeated Castaños (Nov. 23, 1808). Lannes was afterwards appointed to the chief command of the army besieging Saragossa. The details of this remarkable siege are eloquently and graphically described in General Napier's 'History of the Peninsular War,' vol. ii. c. 2.

On the breaking out of the second war with Austria, Lannes had the command of the second corps of Napoleon's army, composed of 50,000 men. In the battle of Essling, while resisting the attack of the Austrians, a cannon-ball carried away the whole of his right leg and the foot and ankle of the left. Lannes lingered for nine days in great agony, and died May 31, 1809.

LANNION. [Côtes-du-Nord.]

LA'NSIUM, a genus of the natural family of *Meliaceæ*, which produces one of the highly esteemed fruits peculiar to the Malayan Archipelago, though unnoticed in many works where we might expect to find it fully described. The fruit is of an agreeable taste, according to Marsden, though the skin contains a colouring juice, extremely bitter, and which is apt to taint the fruit if not opened with care.

LANTA'NA, a genus of plants of the natural family of *Verbenaceæ*. It has often been stated that they are confined to America; but one species is found in Arabia, and two in India. Piso states that three species, which are confounded together in Brazil under the name *Camara*, are there used for making medicated baths for diseases of the skin. *L. macrophylla* is employed in infusions as a stimulant, and *L. pseudo Thea* as a substitute for tea.

LANTERN, MAGIC. [Magic Lantern.]

LANTIER, ETIENNE FRANÇOIS DE, born at Marseille, Sept. 1, 1734, did not appear as an author till 1778, when his comedy of 'L'Impatient' was performed. Besides his 'Tales' in prose and verse, he wrote the 'Voyages d'Anténor,' 'Les Voyageurs en Suisse,' 'Le Voyage en Espagne,' and the 'Correspondence de Cézarine d'Arly.' He died at Marseille, Jan. 31, 1826.

LANZAROTI. [Canaries.]

LANZI, LUIGI, was born in the Marca d'Ancona, June 14, 1732. He entered the order of the Jesuits at seventeen, and subsequently distinguished himself as an instructor of youth. After the suppression of the order, he was appointed keeper of the cabinet of medals, at Florence, by the Grand-duke Peter Leopold, in 1775. Among his literary productions are the 'Descrizione della Galleria,' 'Notizie Preliminari,' &c., 1789, and the 'Saggio di Lingua Etrusca,' a work of extraordinary study and research, which contributed less however towards its author's fame with the European public than his 'Storia Pittorica.' In Udine, whither he had fled in 1796, to avoid the consequence of the battle of Bassano, he wrote his three dissertations on the so-called Etruscan vases, and made a collection of lapidary inscriptions. Lanzi published a translation of Hesiod in terza rima. His death took place at Florence, March 30, 1810.

LAOCOON, according to ancient fable, was the son of Priam (according to others, of Antenor), and a priest of Apollo during the Trojan war. While offering, in the exercise of his office, a bullock, to render Neptune propitious to the Trojans, two enormous serpents issued from the sea, and, having first destroyed his two sons, whom he vainly endeavoured to save, attacked Laocoon himself, and, winding themselves round his body, crushed him to death in their folds. This dreadful punishment was inflicted by the goddess Minerva for the part Laocoon had taken in endeavouring to dissuade the Trojans from admitting into Troy the fatal wooden horse, which the Greeks had consecrated to Minerva.

An enduring celebrity has been gained for this story from its forming the subject of one of the most remarkable groups in sculpture which time has spared to us. It represents the agonised father and his youthful sons, one on each side of him, writhing and expiring in the complicated folds of the serpents. The figures are naked, the drapery that is introduced being only used to support and fill up the composition. This superb work of art originally decorated the baths of Titus, among the ruins of which it was found in the year 1506. The names of the sculptors who executed it are also recorded. They are Agesander, Polydórus, and Athenodórus, natives of Rhodes. (Pliny, xxxvi. 5).

With respect to the date of the work, the most careful consideration seems to fix these sculptors as late as the early emperors; and Lessing, whose work on the Laocoon deserves the attention of all who take an interest in the philosophy and capabilities of art, believes they lived in the reign of Titus.

This group is justly considered, by all competent judges, to be a masterpiece of art. Intense mental suffering is portrayed in the countenances, while the physical strength of all the three figures is evidently sinking under the irresistible power of the huge reptiles wreathed around their exhausted limbs. One son, in whose side a serpent has fixed his deadly fangs, seems to be fainting; the other, not yet bitten, tries to disengage one foot from the serpent's embrace. The father, Laocoon himself, is mighty in his suffering: every muscle is in extreme action, and his hands and feet are convulsed with painful energy. Yet there is nothing frightful, disgusting, or contrary to beauty in the countenance. The whole of this figure displays the most intimate knowledge of anatomy and of outward form. The youths are of a smaller standard than the proportion of the

father; a liberty hardly justifiable, but taken probably with the view of heightening the effect of the principal figure. The right arm of the figure of Laocoon is a restoration. The group of Laocoon and his Sons is now preserved in the museum of the Vatican at Rome. There is a cast of it in the Royal Academy, London.

LAON. [AISNE.]

LAOS comprehends the central portions of the peninsula without the Ganges, lying between 15° and 24° N. lat., and 96° and 103° E. long. It borders on the south on Siam and Cochin China, on the east on the last-mentioned country, on the north on China, on the north-west and west on the Birman empire. The river Saluen divides Laos from Birma; and the country near it is covered with mountain ranges, which do not attain the snow-line, but rise in some parts to a considerable height. This mountain-region is intersected by wide level tracts and plains along the courses of the rivers, which are of great fertility, but low, and are subject to frequent and extensive inundations. The south-eastern part, traversed by the river Camboja, seems to be more elevated. Along the eastern border of Laos there runs a mountain-range, about 100 miles wide, which separates it from Cochin China and Tonkin. The greatest part of the country is covered with forests and swamps or stagnant waters.

The largest of its numerous rivers are the Saluen [BIRMA], the Mackhaun, or Cambodia, and the Menam, which flows through the centre of the country between the two first-named rivers. It rises on the western declivity of the table-land of Yunnan, in two branches, which unite south of 22° N. lat. From the point of junction to 18° N. lat. the river is called the Maepraen; but from thence to its mouth in the Gulph of Siam it is called the Menam. Its length is 800 miles.

The country produces rice, cotton, tea, silk, gum-lac, and a great variety of fruits. The elephant, rhinoceros, cattle, and buffaloes abound. Gold, silver, copper, tin, iron, and rock salt are the chief mineral productions.

The inhabitants of Laos seem to be the original stock of a nation which is widely dispersed over the peninsula without the Ganges, to the east of the river Saluen. According to Gutzlaff they are mostly inferior in civilisation to the Siamese; but yet they have made considerable progress in the various arts of civilised life. They are Buddhists, and their sacred books are written in the Pali language.

Laos is divided into three great portions. The most northern is called Upper Laos; its capital is Kemalatain. South of it lies Lactho, with the capital Chiengmai. The south-eastern part is called Lanchang, or the country of the Shan. Laos has generally been subject to the neighbouring countries in modern times. Towards the end of the last century, Birma possessed much control over Laos: at the present day it is believed that Siam and Cochin China have the greatest influence. The country is distributed among a number of petty sovereigns.

Laos seems to carry on an active trade with Siam, Birma, and China.

LAPALISSE. [ALLIER.]

LAPIS LAZULI. [LAZULITE.]

LA'PITHÆ. CENTAUR.]

LAPLACE, PIERRE SIMON, was born in March 1749, at Beaumont-en-Auge, near Honfleur, and was the son of a farmer. He received a good education, and appears at first to have turned his attention to theology; but as early as the age of eighteen he went to Paris, having previously taught mathematics at his native place. He had letters of introduction to D'Alembert; but, finding that they procured him no notice from that philosopher, he wrote him a letter on some elementary points of mechanics, with which D'Alembert was so much pleased that he sent for Laplace the same day, telling him that he had found a better way of calling attention to his claims than by letters of introduction. Very shortly afterwards the recommendation of D'Alembert procured for Laplace a chair of mathematics at the military school of Paris. This took place in 1768 or 1769. In 1772 Laplace showed his powers in a paper on integration of equations of finite differences in the 'Memoirs' of the Academy of Turin; and from that time his scientific life was one achievement after another, until he attained a reputation almost Newtonian with the world at large, and of the highest extent and character among mathematicians, who, though they cannot even compare walks of so different a kind as those of Newton and Laplace, feel that the latter must be named next after Lagrange, and the two together above all the followers of the first.

The political life of Laplace was not so favourably distinguished. In 1799 the First Consul made him minister of the interior. With the views which Napoleon always professed with respect to science, it is not wonderful that he should have made the experiment of trying to strengthen his administration by the assistance of a philosopher whose rising fame made the French expect to claim a name which should rival that of Newton. But the experiment was not successful; and after a very short period the First Consul removed Laplace to the head of the Sénat Conservateur. The subsequent account given by Napoleon of his minister will be a part of the biography of Laplace in all time to come. 'A mathematician of the highest rank, he lost not a moment in showing himself below mediocrity as a minister. In his very first attempt at business, the consuls saw that they had made a mistake. Laplace looked at no question in its true point of view. He was always searching after subtleties, all his ideas were problems, and he carried the spirit of the infinitesimal calculus into the management of business. This pointed satire is not, we suspect, one of which the force will be always admitted: first, because it is so very like what a satirist ought to say of a mathematician; secondly, because the character of Laplace's mathematical writings is signally and ridiculously the opposite of all the preceding. That Laplace was an incompetent minister is probable, but this is not the worst.

In 1814 he voted for the deposition of his benefactor,—a step which might have been justifiable on public grounds: but nothing can excuse the

suppression of the dedication to Napoleon, which stood at the front of his 'Théorie des Probabilités' during the prosperity of his benefactor, and no longer. Laplace, who had been created a count by Napoleon, and a marquis by Louis XVIII. immediately after the Restoration, did not appear at court during the short restoration of the former. Of his political conduct during the Revolution we have no account, except that he was at one time under the suspicion of the authorities, and was removed from the commission of weights and measures.

After the final Restoration, Laplace's only public employments were of a scientific character, and he died on the 5th of May, 1827. His last words were, 'Ce que nous connaissons est peu de chose; ce que nous ignorons est immense.'

The author of the 'Mécanique Céleste,' to use a common synonyme for Laplace, must be an object of the admiration of posterity as long as any record of the eighteenth century exists. With the exception of some experiments made in conjunction with Lavoisier, to determine the quantity of heat in different bodies, we do not find that Laplace was employed in actual experiment. But for many years he was the head, though not the hand, of European astronomy; and most of the labours of observation were made in directions pointed out by him, or for the furtherance of his discoveries in the consequences of the law of gravitation. Before, however, we begin to speak of them, there is an important caution, for the want of which a reader of the 'Mécanique Céleste' might even overrate Laplace, great as he is.

The French school of writers on mathematical subjects has for a long time been wedded to the reprehensible habit of omitting all notice of their predecessors, and Laplace is the most striking instance of this practice, which he carried to the utmost extent. In that part of the 'Mécanique Céleste' in which he revels in the results of Lagrange, there is no mention of the name of the latter. The reader who has studied the works of preceding writers will find him, in the 'Théorie des Probabilités,' anticipated by De Moivre, James Bernoulli, &c., on certain points. But there is not a hint that any one had previously given those results from which perhaps his sagacity led him to his own more general method. The reader of the 'Mécanique Céleste' will find that, for anything he can see to the contrary, Euler, Clairaut, D'Alembert, and above all Lagrange, need never have existed. The reader of the 'Système du Monde' finds Laplace referring to himself in almost every page, while now and then, perhaps not twenty times in all, his predecessors in theory are mentioned with a scanty reference to what they have done; but the names of those observers between whom and himself there could be no rivalry occur in many places. It is true that at the end of the 'Mécanique Céleste' he gives historical accounts, in a condensed form, of the discoveries of others; but these accounts never in any one instance answer the question—Which pages of the preceding part of the work contain the original matter of Laplace, and in which is he only following the track of his predecessor?

The consequence is, that a student who has followed the writings of Laplace with that admiration which they must command is staggered when he comes afterwards to find that in almost every part of the work there are important steps which do not belong to Laplace at all. He is then apt to imagine that when he reads more extensively he shall find himself obliged to restore more and more to the right owner, until nothing is left which can make a reputation such as is that of Laplace with the world at large. Such an impression would be wholly incorrect; but it would be no more than the just reward of the practice of suppression. Nevertheless the researches on the figure of the planets and on the tides in the 'Mécanique Céleste,' and the general method of the 'Théorie des Probabilités' for the approximation to the values of definite integrals, are alone sufficient, when all needful restoration has been made, to enable us to say, that Laplace was one of the greatest of mathematicians.

The first two volumes of the 'Mécanique Céleste' appeared in the year VII. of the Republic (which lasted from the 22nd of September, 1798, to the 21st of September, 1799), and may have been the inducement of the First Consul to make Laplace a member of the government. The third volume appeared in 1802, the fourth in 1805, and the fifth in 1825. One posthumous supplement has appeared.

We have spoken freely of the defects of Laplace's character, both political and scientific, and it is now our more pleasing task to say a few words on the 'Mécanique Céleste' as a whole. We might dwell upon the great discoveries, such as those of the long inequality of Saturn and Jupiter, the cause of the acceleration of the moon's mean motion, the explanation of the peculiarities in the motion of Jupiter's satellites, with a long train of similar achievements. But this, though the most common method of describing the character of a philosopher, is not the sort of description which should be given of the 'Mécanique Céleste.' Its bulk is about 2000 quarto pages; and, owing to the omission of all the steps which a good mathematician may be relied on as able to supply, it would, if expanded to the extent in which Euler would have written the same matter, have probably reached 10,000 pages. If all this work had been collected by one man, even from the writings of others, we should have called him the Delambre of the theory of gravitation, and should have prized his writings for their extent, their faithful representation of the state of the science at a particular time, and the diligence displayed in the undertaking. When to the preceding, which is forgotten in the splendour of some of the results, we add, that to Laplace is due the discovery of much, the development of more, and that by the employment of his own resources in a manner which takes all the originality and power of the investigator, and the arrangement and combination of the whole, we may begin to see how he has earned his fame.

Laplace explained his discoveries in a work entitled 'Exposition du Système du Monde,' of which the fifth edition bears the date 1824.

The account here given is in style and clearness of a superior kind, somewhat too egotistical, and partaking of the disposition to suppression already noticed. A similar companion to the Theory of Probabilities appeared as a preface to the work itself, and was published separately (fifth edition, 1825), under the title of 'Essai Philosophique sur les Probabilités.' A little treatise, published in 1821, called 'Précis de l'Histoire de l'Astronomie,' afterwards was made the fifth book of the fifth edition of the 'Systême du Monde.' His lectures on the elementary branches of mathematics are in the 'Leçons de l'Ecole Formale.'

Of the 'Théorie des Probabilités' we must speak precisely as of the 'Mécanique Céleste,' adding perhaps that there is no part of the latter in which more original power is displayed than in the former. The subject being somewhat isolated, its results are little known; they have however been extensively applied to astronomy, both by Laplace himself, and particularly by the German writers.

The 'Mécanique Céleste' was partly translated into English by a learned American writer, Dr. Bowditch, whose death, though it prevented his superintending the close of his work, did not take place till the whole was ready for press. Mrs. Somerville's work 'On the Mechanism of the Heavens' is a selection from the 'Mécanique Céleste,' involving all the fundamental parts of the theory of gravitation. The 'Systême du Monde' was translated by the late astronomer royal, Mr. Pond. The fundamental parts of the 'Théorie des Probabilités' will be found in the 'Encyclopædia Metropolitana,' article 'Theory of Probabilities;' and the method of using Laplace's results, with no other knowledge than that of common arithmetic, in the 'Essay on Probabilities' in Dr. Lardner's 'Cabinet Cyclopædia.' The last edition of the 'Encyclopædia Britannica' contains an article on Probabilities, in which the same results of analysis are treated.

LAPLAND, the country of the Laplanders, comprehends the northern and north-eastern part of the Scandinavian peninsula. In the twelfth century, the Laplanders inhabited the whole country, from 64° to 71° N. lat., and from the White Sea to the Atlantic; but only a portion of this region is now known by the name of Lapland.

Lapland probably comprises an area of about 120,000 square miles, of which about one-half is subject to Russia, and the other half to Sweden and Norway. Russian Lapland is separated from Swedish Lapland by the river Muonio and the Tornea Elf, and from Norwegian Lapland by the Tana Elf. Russian Lapland is divided between the two governments of Archangel and Uleaborg; in the former it constitutes the district of Kola, and in the second that of Tornea. Swedish Lapland is divided between the two districts (lans) of Pitea and Umea. Norwegian Lapland is called Finmarken.

Along the Norwegian coast lies the mountain-range of the Kiölen, which rises in some places to a height of 6000 feet; and nearly the whole distance from thence to the Gulf of Bothnia is bare and sterile. Russian Lapland is an extensive plain, generally covered with sand, but some isolated hills rise on the plain to an elevatio of several hundred feet. It has many small lake and rivers, and forests of stunted trees.

The climate is very cold. Three-fourths of th year the country is covered with snow, and th frost between November and March is ver intense. A few days of intensely hot weathe occur in July and August.

Four nations inhabit Lapland—the Laplander Swedes and Norwegians, Finlanders, and Rus sians. The original inhabitants, the Laplander are mostly located in the sterile districts north ward of the polar circle. Their number does no exceed 7000, and they are divided into reindee Laplanders and fishing Laplanders. The forme live mostly on the produce of their herds, whic sometimes number 1000 head. The fishing Lap landers are dispersed among the lakes and alon the banks of the rivers, where they live on th produce of their fisheries. The number of th Swedes and Norwegians is very considerable; the occupy those tracts which are adapted to agricul ture, where they cultivate rye, barley, oats, an potatoes. But the best pasture-grounds and mea dows are in possession of the Finlanders. Th Russians live only in the district of Kola, wher they are chiefly occupied as fishermen or as mer chants.

Wild animals are numerous, including bear beavers, wild reindeer, wolves, lynxes, wolverine foxes, hares, squirrels, martens, otters, and lem mings. Among the birds are eagles, capercailie woodcocks, and a variety of sea-birds. The forest which cover a considerable part of the surface the country, consist mostly of birch, fir, pine, alde and aspen.

LAPO, ARNOLFO DI, the name by whic a very celebrated and one of the most early of th Italian architects is known. He is so called b Vasari, and is said by him to have been the so of Lapo, a German, whose real name was Jaco He executed many works in Florence, and died ther according to Vasari, in 1262. Recent research however have shown that Arnolfo and Lapo we not otherwise connected further than that the were contemporaries in Florence. Arnolfo w the son of Cambio, a native of Colle, and, accor ing to Vasari, was born in 1232. He was t greatest architect of his time in Florence. T walls of Florence, which were erected in 128 were planned by Arnolfo. He built the logg and piazza de' Priori, and the great church Santa Croce. But his greatest work is the chur of Santa Maria del Fiore, or the Cathedral Florence. He raised the walls, covered them and faced them, but the great dome was the w of Brunelleschi. Arnolfo died, according to V sari, in 1300; aged therefore 68, and not 60, Vasari says, if the year of his birth as given Vasari himself be correct.

LAPPA, a genus of plants belonging to t natural order *Compositæ*, the sub-order *Tubu florœ*, the tribe *Senecionideæ*, and the sub-t *Carduineæ*. *L. minor* has an erect stem, 3 f or more in height with many wide-spread branches. When in flower, the involucre rea breaks from the stalk, and is known in

country by the name of a *Bur*. It adheres to the coats of animals and the hair and clothing of those who pass by, and it is almost impossible to become free from it without breaking the scales asunder and scattering the fruit. In grows in waste places throughout Europe and the west of Asia. *L. major* and *L. tomentosa* are species which are found in Germany and Switzerland.

LA'PSANA, a genus of plants belonging to the natural order *Compositæ*, the sub-order *Ligulifloræ*, the tribe *Achoraceæ*, and the sub-tribe *Lampsanæ*. There is only one British species of this genus, the *L. communis*, Nipplewort. It is found in waste uncultivated land, and derives its common name from its reputation in village medicine, as a soothing application to inflamed nipples. *L. fœtida* is a species of this genus, which grows in Switzerland and on the Alps.

LAPSE. [Advowson.]

LAPWING. [Plovers.]

LARCENY (*Latrocinium*, Latin; *Larcin*, French) is the legal term for theft.

This crime was formerly divided into grand and petty larceny, distinguished by the value of the property taken at one and the same time. It was grand larceny where the value was more than twelve pence; petty larceny where the value did not exceed that amount: a distinction referable to times in which twelve pence was more than equivalent to as many shillings of the present currency. At common law the punishment of petty larceny was whipping or imprisonment; that of grand larceny was death, unless the offender were in a situation to claim benefit of clergy, of which mode of escaping punishment neither women, nor men who were unable to read, or who had been twice married, or who had married widows, or who, not being actually clergymen, had before taken the benefit of clergy, could avail themselves. [Benefit of Clergy.] By 4 George I. c. 11, grand and petty larceny were made punishable by transportation. By 7 and 8 George IV. c. 28, the distinction between grand and petty larceny was abolished; and larcenies are now distinguished as Simple Larceny, or Compound Larceny, sometimes called Mixed Larceny.

I. Simple Larceny at common law is committed by wrongfully taking, against the will of the owner, and carrying away, the goods of another, with the fraudulent and felonious intent wholly to deprive him of his property therein.

The taking may be either actual or constructive. It is actual taking against the will of the owner when goods are either taken directly out of the possession of the owner, or out of the keeping of another person who holds them for the owner. Constructive taking against the will of the owner is either where the possession of goods is obtained from the owner with an intention to steal them, in which case the original taking is felonious; or where the owner, without parting with the legal possession, delivers goods into the hands of a person who afterwards converts them to his own use or to some other purpose inconsistent with the continuance of the owner's property in them; in which case such conversion constitutes the felonious taking. The doctrine of constructive taking has given rise to many nice distinctions in the English law, some of which it is not easy to reconcile with the fundamental notion of theft or larceny.

There must not only be a taking, but also a carrying away, technically called asportation; to constitute which the goods stolen must be actually removed from the position which they before occupied. Entire removal, to however slight a distance, is a sufficient asportation. But, where a severance is necessary before the thief can have the entire control over the article, the asportation is not complete until such severance is effected; as if goods in a shop are fastened by a string to the counter, or a purse is entangled with keys in the owner's pocket.

The thing taken must be goods; and at common law larceny could be committed only in respect of personal goods. Things real, or things annexed to the soil, technically called the realty, or which are connected with the soil and freehold, were not subjects of larceny at common law. This rule was observed so strictly, that larceny could not be committed by stealing title-deeds, nor by stealing growing corn, grass, trees, &c., unless severed from the realty by the thief or by the owner, or by a third person, and taken at another time.

The subject-matter of larceny at common law must also have been of things *in possession*, as distinguished from things (technically called *choses*) *in action*, *i. e.* things which are of no intrinsic value, but are capable of being made available by action or demand, as deeds, bonds, bills, notes, and other securities for money, &c.

The inconvenience arising from these rules, which are adapted to a very different state of society, is remedied by several statutes passed during the last and the present century.

The objection founded upon the connection of the thing stolen with the realty is removed by several provisions of 7 and 8 Geo. IV. c. 29, sec. 23, &c.

The Post-Office Act, 7 Will. IV. and 1 Vict. c. 36, s. 26, makes the stealing and embezzling of post-letters, letter-bags, &c., felony, punishable with a greater or less degree of severity, according to the nature of the offence and the existence or non-existence of a confidential character in the guilty party.

The goods taken should generally be the goods of another person.

If a man take his own goods, supposing them to be the goods of another, no larceny is committed. But it is larceny if a man takes them for the purpose of fraudulently charging another with the loss; as if a man steal his own goods for the purpose of charging the bailee, or of throwing the supposed loss upon the hundred. If a wife take and convert to her own use the goods of her husband, they being but one person in law, it does not constitute larceny.

The converting of found goods by the finder to his own use does not amount to larceny, unless at the time of the conversion he knows, or has the means of knowing, who is the real owner.

There must be an intent wholly to deprive the owner of the goods stolen of his property therein;

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which intent constitutes the fraudulent and felonious character of the act.

Persons convicted of simple larceny are, by the 7 & 8 George IV. c. 29, made liable, at the discretion of the court, to be transported for seven years, or to be imprisoned for a term not exceeding two years, and, if males, to public whipping in addition to imprisonment; and the court is empowered to sentence the offenders to be imprisoned and kept to hard labour, and also to direct that they shall be kept in solitary confinement as to the court in its discretion shall seem meet. The 7 Will. IV. & 1 Vict. c. 90, s. 5, restrict the courts from directing that any offender shall be kept in solitary confinement for any longer period than one month at a time, or than three months in the space of one year. The punishment of transportation for simple larceny is repealed by the 11 Vict. c. 12, except in certain cases.

As cattle are necessarily left in fields and upon commons and wastes without any person to attend them, the legislature has interfered to protect property of this description by heavier punishments than those inflicted in other cases of larceny. (7 & 8 Geo. IV. c. 29; 7 Will. IV. and 1 Vict. c. 90.)

A person guilty of larceny may be indicted for the offence at the suit of the crown; and the party injured, and indeed any other person, may prefer a bill of indictment without the leave or even the knowledge of the crown or its officers.

II. It is Compound Larceny when larceny is accompanied by circumstances which the legislature has considered as aggravating the offence and requiring an increase of punishment.

Under 7 & 8 George IV. c. 29, s. 6, stealing from the person of another, whether openly or clandestinely, is a felony punishable by transportation for life or not less than seven years, or imprisonment for not more than four years with or without whipping. To constitute this offence the thing stolen must be completely removed from the person of the owner, though such complete removal is not necessary in cases of simple larceny. It is no answer to the charge, that such force or fear was used as would make the offence amount to robbery. [Robbery.]

Breaking and entering any church or chapel (by which is meant a chapel in connection with the established religion) and stealing therein any chattel, or breaking out of any church or chapel after having stolen any chattel therein, is punishable with transportation for life or for not less than seven years, or imprisonment not exceeding three years, with or without hard labour and solitary confinement, by 6 & 7 William IV. c. 4.

Breaking and entering a dwelling-house and stealing therein any chattel, money, or valuable security to any value whatever, or stealing in a dwelling-house any chattel, money, or valuable security to the value of 5*l.* without a breaking and entering, is now, under 7 Will. IV. and 1 Vict. c. 90, a felony punishable by transportation for not more than fifteen or less than ten years, or imprisonment not exceeding three years.

LARCH. [Abies.]

LARCHE'R, PIERRE HENRI, born at Dijon in 1726, made himself known by several translations from the Greek classics, the principal of which is his translation of Herodotus, Paris, 1786. In 1774 Larcher published a 'Memoir on the Goddess Venus,' which obtained the prize of the Academy of Inscriptions. He had a controversy with Voltaire, in consequence of some strictures which he wrote on Voltaire's 'Philosophie de l'Histoire.' Larcher was a member of the National Institute. He died at Paris, in December 1812.

LARDIZA'BALA, a genus of plants belonging to the natural order *Menispermaceæ*, and named after Michael Lardizala, a Spanish naturalist. This plant is a twining shrub, a native of Chili in woods at Concepcion, also in Peru about Arauco. It has an eatable fruit, which is gathered and sold in the markets of Chili and Peru. The pulp of the fruit is sweet and grateful to the taste.

LARDNER, NATHANIEL, D.D., born 1684, died 1768, was a Presbyterian minister. He studied at Utrecht under Grævius and Burmann, and afterwards at Leyden. He became private chaplain in the family of Lady Treby, who died in 1729, and was a lecturer at the dissenting chapel in the Old Jewry. His 'Credibility of the Gospel History,' the 'Supplement' to it, and his 'Jewish and Heathen Testimonies,' have been considered as the most rational defences of Christianity that had been made up to his time. The most remarkable of his minor publications is his 'Letter on the Logos,' in which it distinctly appears that he was of the Unitarian or Socinian school. The best edition of his works is that by Dr. Andrew Kippis.

LAREDO. [Castila-la-Vieja.]

LARES, among the Romans, were household gods; the guardians of their hearths and families. According to Ovid ('Fasti,' v. 146) there were generally two of them, who were sometimes represented with a dog at their feet. Others were clothed in the skin of a dog. They usually held a cornucopiæ in their hands as a symbol of good housekeeping. The festival of the Lares was celebrated on the first of May, when they were crowned with garlands, and sacrifices were offered to them.

LARGENTIE'RE. [Ardeche.]

LARGHETTO, a musical term, a diminutive of Largo, slow, but less so than Largo.

LARGO, in music, signifies slow. [Adagio.]

LARGS. [Ayrshire.]

LA'RIDÆ, the name of a family of birds belonging to the order *Natatores*, and commonly known as Sea-Gulls, or Sea-Mews.

It is impossible within reasonable limits to follow out the opinions of writers on ornithology relative to the position and genera to be assigned to this family. We can therefore only refer to the writings of Willughby, Ray, Brisson, Lacépède, Meyer, Dumeril, Temminck, De Blainville, Lesson, the Prince of Musignano, Mr. Eyton, and others.

Mr. Vigors (in 'Linn. Trans.,' vol. xiv.), after commenting on the affinities of the *Laridæ* to other connected families, thus expresses himself with regard to the contents of the family.

'We enter,' he says, 'the family of *Laridæ* by means of *Sterna*, with which *Rhynchops*, Linn.,

most intimately accords in habits and external characters, notwithstanding the dissimilitude of the bill. The *Sterna Anglica*, or Gull-Billed Tern of Colonel Montagu, conducts us from these genera to the groups which compose the Linnæan *Larus*, now justly subdivided into two genera, the *Lestris*, Ill., and *Larus* of authors. From this group we are led to the genera *Diomedea*, Linn., and *Haladroma*, Ill., which are characterised by the absence of the hind toe, by means of the species *Larus tridactylus*, Lath., where, though the hind toe is not absolutely deficient, as might be inferred from the specific name, there appears but the rudiment of one, or rather a stump without a nail. The last-mentioned genus, *Haladroma*, originally belonged to the *Procellaria*, Linn., and was separated from it by its tridactyle foot. Even in this character however it forms a passage from *Larus* to the groups that compose the genuine *Procellaria*, all of which are distinguished by the singular peculiarity of having no true hind toe, but a nail adhering to the tarsus in its place. We thus arrive at the Petrels, separated into the groups of the *Procellaria*, Auct., *Pachyptila*, Ill., *Puffinus*, Ray, and the section denominated by M. Temminck 'Les Pétrels Hirondelles.' These two latter groups appear to lead us back to the *Terns*, or *Sea-Swallows*, from whence we started. The whole of this family, which corresponds with the *Longipennes* of M. Cuvier, is distinctly characterised by the strength and expansiveness of their wings, with the aid of which they traverse immeasurable tracts of the ocean in search of their food, and support their flight at considerable distances from land, seldom having recourse to their powers of swimming. We may thus discern the gradual succession by which the characters peculiar to the order descend from the typical groups that swim and dive well and frequently, but make little use of their wings for flight, to the present groups, which are accustomed to fly much, but seldom employ their powers of swimming, and never dive.'

Mr. Swainson regards the *Laridæ* as a subfamily, consisting of the following genera and subgenera:—*Sterna* (Terns), including *Sterna*, Linn.; *Thalassites*, Sw.; *Phaëton*, Linn.; *Rhynchops*, Linn.; *Gavia*, Brisson; *Larus*, Linn.; *Lestris*, Ill.; Petrels, including *Procellaria*, *Diomedea*, Linn. [Albatross]; *Haldroma*; *Thalassidroma* (Stormy Petrels); *Pachyptila*; and *Dromas*. For ourselves we do not regard the Petrels and Albatrosses as belonging to the family *Laridæ*. The writer of the 'Pictorial Museum of Animated Nature' places the Albatross, Petrels, Shearwater, &c., all with nostrils more or less tubular, in a family termed *Procellaridæ*, while his *Laridæ* consist of the True Gulls, the Parasitic Gulls, the Terns, and the Skimmer of the Sea (*Rhynchops*).

In the present article we shall confine ourselves to the Gulls only, including in that term *Xema* of Leach, *Larus* of Linnæus, and *Lestris* of Temminck. The other groups will be noticed under their respective titles.

The Gulls are powerful on the wing, and easy and graceful in their aerial movements; they often rest floating on the water, but they do not dive, yet they skim off floating substances as dead or living fish, and the putrescent exuviæ of the sea, with great address. Some are predatory in their habits, and like the Sea-Eagle force the more feeble fishers to disgorge their booty. In most species, the plumage undergoes a decided change of colour on the approach of winter, by a process which Mr. Yarrell has proved to be different from that of moulting ('Trans. Zool. Soc.,' vol. i. p. 13). The young differ from their parents, and do not acquire their perfect colouring until the second or third year. The gulls breed in large companies, and in various situations, according to the habits of the species, some selecting the ledges of cliffs, others choosing flat and exposed rocky islands, while others seek the marshes and pools of the more inland parts, and form their nests among aquatic herbage. These birds have a very wide geographical distribution, and are found in every part of the world, and under a great variety of climate; many, especially of the larger species, are inhabitants of the higher latitudes.

Genus *Xema*.—Bill short, slender, straight, laterally compressed, its tip bent down, the lower mandible somewhat angulated beneath; nostrils lineal; tibiæ naked on the lower part; tail forked. In the genus *Xema*, the head becomes entirely or partly of a dark colour, as the season of reproduction approaches, being white during the rest of the year. In the genus *Larus* the head is of an unsullied white during summer, becoming streaked and varied with blackish gray in winter.

Example.—The Black-Headed Gull (*Xema ridibundus*), the Laughing Gull of Rennie, the Red-Legged Gull of Shaw.

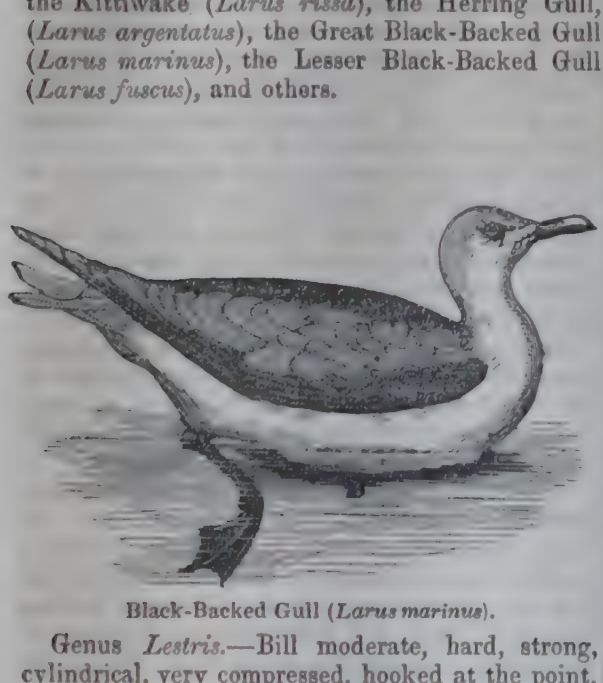
Laughing Gull (*Xema ridibundus*).

This bird is common in our islands, retiring in summer from the sea to breed in inland marshes, after which it returns in flocks to the coast. Its note is a hoarse cackle. Its food consists of fishes, crustaceæ, and the larvæ of coleopterous insects.

Genus *Larus*.—Bill moderate, strong, straight, cultrated, the upper mandible having the tip incurved; symphysis of the under mandible strongly angulated, and ascending thence to the point; nostrils placed in the middle of the bill, lateral, oblong, narrow; tongue pointed, with the extreme tip cloven; wings long, acuminated; tail even, or slightly forked; legs placed near the centre of the body, of mean length and strength, with the lower part of the tibiæ naked; feet of four

toes, three before and one behind; the three in front united by a membrane, the hind one short and free.

Examples.—The Common Gull (*Larus canus*), the Kittiwake (*Larus rissa*), the Herring Gull, (*Larus argentatus*), the Great Black-Backed Gull (*Larus marinus*), the Lesser Black-Backed Gull (*Larus fuscus*), and others.



Black-Backed Gull (*Larus marinus*).

Genus *Lestris*.—Bill moderate, hard, strong, cylindrical, very compressed, hooked at the point, the upper mandible covered with a cere; the under mandible with an angle on the inferior edge; nostrils approaching the front of the bill, diagonal, narrow, closed on their posterior part, and pervious; tarsi long, naked above the knee; feet with three toes before, entirely palmated; hind toe very small; nails large and hooked; tail slightly rounded, two middle feathers elongated; wings with the first quill-feather the longest.

Examples.—The Common Skua (*Lestris cataractes*, Temm.), the Pomarine Skua (*Lestris Pomarinus*, Temm.), the Arctic Skua (*Lestris parasiticus*, Temm.).

The Skuas are bold and ferocious birds, natives of the northern latitudes, breeding on wild heaths and solitary islands. They are the determined enemies of the Gulls, which they unceasingly persecute on the wing, in order to force them to disgorge their recently swallowed food, which is caught before it can reach the water. Their flight is strong and rapid.

LARKS, a sub-family of the *Fringillidæ*, thus defined by Mr. Swainson:—Bill more lengthened than in any of the *Fringillidæ;* the tip entire or absolutely notched. Tertial quills considerably lengthened, pointed, and generally as long as the quills. Claws very slightly curved; the claws of the outer toe always shorter than those of the inner toe; hinder claw considerably lengthened, and either nearly straight or very slightly curved. Typical genus *Alauda*. The other genera are—*Calendula*, *Agrodroma*, *Macronyx*, and *Certhilauda*. [FRINGILLIDÆ.]

LARNE. [ANTRIM.]

LARNIKA. [CYPRUS.]

LARREY, DOMINIQUE-JEAN, BARON, was born at Beaudeau, near Bagnères de Bigorre, in France, in July 1766. He studied the elements of medicine and surgery at the hospital at Toulouse, under the direction of his uncle Alexis Larrey, who practised medicine in that city. In 1787 he went to study his profession in Paris, and obtained the appointment of surgeon to the frigate Vigilante, in which he visited North America. He returned to Paris at the commencement of the Revolution, and in 1792 joined the French army which was then carrying on its operations on the Rhine. Here he distinguished himself by the invention of the *ambulances volantes*, by means of which the wounded, being first dressed, were carried off the field of battle, even under the fire of batteries. He was at the siege of Toulon where he became acquainted with Napoleon Bonaparte, who was then a lieutenant of artillery. In 1796 he was appointed a professor in the school of medicine and military surgery at Val de Grace. In 1798 he accompanied the French army with Napoleon to Egypt, and on his return published an historical and surgical account of the expedition, with the title 'Relation historique et chirurgicale de l'Expédition de l'Armée d'Orient en Egypte et en Syrie,' 8vo., Paris, 1803. From this time he was advanced to various honourable positions. After the battle of Wagram he was made a Baron of the Empire, and in 1812 he was made surgeon-in-chief of the imperial army. He died at Lyon, July 25, 1841. Larrey was a great favourite with Napoleon, who bequeathed to him at his death 10,000 francs, expressing his conviction that 'Larrey was the most virtuous man he had ever known.'

Larrey published many works besides that above referred to, which contain a great mass of valuable surgical observations.

LA'RRIDÆ, a family of hymenopterous insects, of the section *Fossores*, containing the following genera: 1, *Palarus;* 2, *Tachytes;* 3, *Larra*; 4, *Dinetus;* 5, *Miscophus*. (Shuckard's 'Essay on the indigenous Fossorial Hymenoptera.')

LARVA, a term applied to that state in which an insect exists immediately after its exclusion from the egg, and which precedes the pupa state. The animals commonly called *Grubs*, *Maggots*, and *Caterpillars*, are larvæ. Grub appears to be a general term analogous to larva; the term maggot is most generally applied to the larva state of Dipterous insects; and caterpillar, in the most common acceptation of the term, is used to designate the larva state of lepidopterous insects. These three terms however are used in a very vague manner.

The most striking difference perhaps which exists between the larva and the perfect insect consists in the superior powers of locomotion and consequently better developed skeleton possessed by the latter.

Though larvæ never possess wings, they vary much as regards the development of the locomotive organs, and, as these are more or less perfect, so does the larva resemble or recede from the insect in its imago state. Hence Messrs. Kirby and Spence divide larvæ into two sections: those which, in general form, more or less resemble the perfect insect; and those which are unlike the perfect insect. The larvæ of both sections moult or cast their skin, several times during their pu-

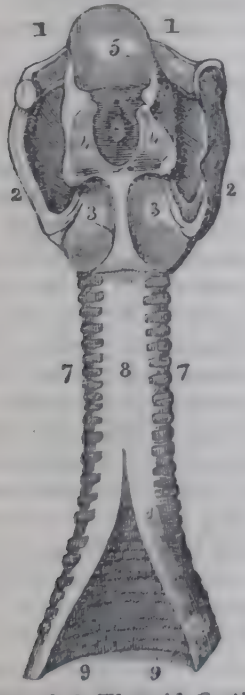
gress to maturity. The number of moults varies according to the species, and the period intervening between the moults depends upon the length of the insect's existence in the larva state. In these moults, not only is the whole external covering of the insect cast, but even the lining of the intestinal canal and of the tubes of the tracheæ is shed.

The greater portion of the larvæ of the orders *Orthoptera*, *Hemiptera*, and *Homoptera*, excepting that they have no wings, bear a considerable resemblance to the perfect insect, and hence belong to the first of the sections just mentioned. As however the muscles which serve to support and give motion to the wings are attached to the skeleton of the thorax, so, as might be expected, we find this part in the perfect insect more unlike that of the larva perhaps than any other; and again, where (as in the imago state of *Scutellera*) a portion of the thorax is greatly produced behind and serves to protect the wings when folded, the larva, having no wings, does not possess this peculiarity.

Belonging to the second division, in which the larva does not resemble the perfect insect, are the orders *Hymenoptera*, *Coleoptera*, *Neuroptera*, *Lepidoptera*, and *Diptera*. [INSECTA.]

LARYNX is the organ of the voice. Its framework is composed of five cartilages, which are capable of being moved on each other in various directions by muscles, so as to act upon two elastic bands, on which the voice essentially depends, and which are called the vocal ligaments.

Fig. 1.



1, 1, Os Hyoides; 2, 2, Thyroid Cartilage; 3, 3, Cricoid Cartilage; 4, 4, Arytenoid Cartilages; 5, Epiglottis; 6, Aperture of communication between Glottis and Pharynx; 7, 7, Rings of Trachea; 8, Situation of transverse posterior Muscular Bands; 9, 9, Portion of Trachea cut open from behind.

The first, the thyroid cartilage (2, 2), consists of two plates of dense, tough, fibro-cartilaginous substance, of an irregularly quadrilateral form, united at the lower part of their anterior edges. The prominence of this angular union is felt in the front of the throat, forming what is called the Pomum Adami; at the sides of and behind which the form of the cartilage may be easily traced out with the fingers.

The cricoid cartilage (3, 3) has somewhat the form of a signet-ring. It is inclosed within the angle of the thyroid cartilage, beneath whose lower edge the front and narrowest portion of its ring may be felt, with an interval of about a quarter of an inch between them.

The arytenoid cartilages have each the form of an irregular triangular pyramid (4, 4). They are placed upon the upper edge of the broad part of the cricoid cartilage, just within the most expanded part of the angle formed by the receding plates of the thyroid.

The epiglottis (5) is of a somewhat ovate form. It is attached by its apex to the angle of union of the plates of the thyroid cartilage, and projects obliquely backwards and upwards over the cricoid and arytenoid cartilages, like a shield, guarding them from the contact of foreign bodies passing from the mouth.

These cartilages are connected chiefly by elastic ligament which is arranged in bands of varying thickness throughout the whole of the larynx; uniting the upper edge of the thyroid cartilage to the os hyoides, and its lower edge to the cricoid cartilage; passing also from the arytenoid cartilages to the epiglottis, and uniting the rings of the trachea and bronchi; affording to all a firm but yielding connection, and endowing them by its elasticity with the power of resounding in accordance with the vibrations originating in the vocal ligaments.

The vocal ligaments are two narrow bands of highly elastic tissue, stretched between the anterior angle of the thyroid and the anterior surfaces of the arytenoid cartilages. The substance of which they are composed is a yellowish, dense, fibrous tissue, which is placed in those parts of the body where a permanent elasticity is required, as in the spaces between the laminæ of the vertebræ, the coats of arteries, the rings of the trachea, &c. In *Fig.* 2 a profile view of the right vocal ligament is

Fig. 2.

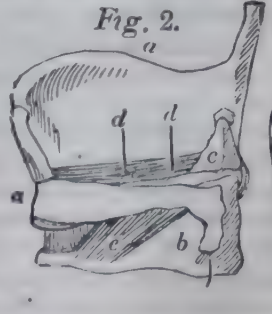


Fig. 3.

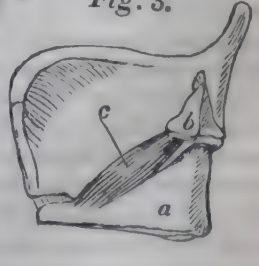
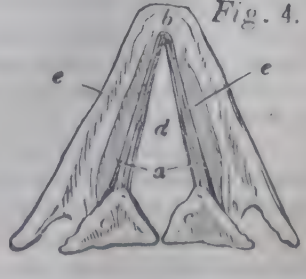


Fig. 4.



shown: *a*, *a*, *a* is the outline of the thyroid cartilage, of which part of the left side is removed; *b* is the cricoid cartilage, and *c* the arytenoid cartilage of the right sides; *d*, *d* is the vocal ligament. In fig. 3 the crico-arytenoidei-laterales (*c*) are shown attached to the cricoid cartilage (*a*), and to the outer angle of the artenoids (*b*). In *Fig.* 4, the view of the vocal ligaments *a*, *a* is taken as seen from above; they are attached anteriorly to the inside of the thyroid cartilage at *b*, and posteriorly to the front of the arytenoid cartilages *c*, *c*. Between them is the aperture through which we breathe, the glottis *d* (*fig.* 4). It is bounded posteriorly by the inner edges and anterior angles of the arytenoid cartilages; anteriorly by the inner edges of the vocal ligaments. When at rest, as during quiet breathing, the glottis is of a somewhat lanceolate form, but when speaking or singing it is very much narrowed.

The muscles acting on the parts of the larynx just described are arranged symmetrically and attached to corresponding points on each side of the larynx; and their names are compounded of those of the cartilages on which they are inserted.

The simplest actions of these muscles in regard to the voice may be thus stated: the crico-thyroid stretch the vocal ligaments; the thyro-arytenoid relax them; the posterior crico-arytenoid open the glottis; the lateral crico-arytenoid and the posterior arytenoid narrow or close it.

Below, the larynx opens into the trachea (*fig.* 1, 8), which is continued into the chest, and there divides into two branches, the bronchi, whose ramifications and terminations form the air-passages and air-cells of the lungs. The trachea is composed of a series of cartilaginous incomplete rings, which are united behind by muscular fibres, and are connected together by longitudinal elastic bands. It is thus capable of variations both of length, breadth, and tension, and of entering into vibrations with the column of air contained in it, and of assisting in communicating those vibrations through its branches to the walls of the chest.

The larynx has been compared to a variety of musical instruments, and it will be seen that in its different parts it unites the principles of several. In its essential vocal apparatus it most nearly resembles the reed instruments, as the reed-pipes of the organ, the clarionet, &c., or rather a modification of them, in which the vibrating body is not fixed in its dimensions as a metallic tongue, or a reed, but consists of a lamina of elastic membrane, capable of varied degrees of tension, as well as of alterations in its length. No musical instrument has yet been constructed on this principle, unless we consider as such the various kinds of trumpet in which the vibrations are produced by the air impelled against the edges of the lips, rendered more or less tense by the action of their orbicular muscle. The principle has been applied in the formation of artificial larynges by Biot, Cagniard de la Tour, Willis, &c., who have chiefly used caoutchouc membrane; and by Müller and Henle, who have employed besides either the vocal ligaments themselves or laminæ of the elastic coat of an artery. The most complete examination of the subject is that made by Müller, and published in the first part of the second volume of his 'Physiologie des Menschen.'

The notes produced by the glottis are subjected to modifications in timbre, strength, and purity, by the parts connected with the larynx, both above and below the vocal ligaments; but it is difficult to determine the circumstances on which the differences of the timbre of the voice in different persons depend. The difference between the male and female voices is probably owing to the comparative shortness of the vocal ligaments in the latter. According to Müller, their average length in man is 18¼ millimetres, in woman only 12⅔, or or nearly as 3 to 2. But to account for the differences of tenor and bass, or of soprano and alto voices, no good evidence has yet been collected. The average compass of the voice is two octaves, but in different parts of the scale in different persons: thus a bass voice commonly has its lowest note four or five notes lower than a tenor, while a tenor has its highest note from four to five notes above the highest note of the bass voice. A soprano voice again has its lowest note at nearly the same part of the scale as the highest note of a bass voice; and thus the whole compass of the human voice, from the lowest of the bass to the highest of the soprano, would be nearly four octaves. The voices of children resemble very nearly those of women, but in males a remarkable change takes place at puberty, when the voice is said to crack. The change from the shrill treble voice of the boy to the fuller and rounder tone of the man is sometimes perfected almost suddenly; but in most cases it is for some time in progress, wavering between the two extremes, deep and manly during quiet enunciation, but, when any exertion is used, suddenly starting up again to the shrill tones of boyhood. In old age, the cartilages of the larynx becoming bony, the ligaments hard and unyielding, and its muscles pale and powerless, the voice completely alters, and it trembles as if there were not sufficient strength in the muscles to maintain a due tension of the vocal ligaments. Besides being subservient to the voice, the larynx fulfils other functions of vital importance to the whole body. In breathing, for example, its exquisite sensibility is immediately excited by the contact of any foreign substance, or of a deleterious gas, and the glottis is firmly closed by the thyro-arytenoid muscles, to prevent the entrance of the noxious body into the lungs. The same action occurs as we swallow each portion of our food, to prevent any of it passing into the lungs; and, if a particle by accident touch the glottis, coughing is excited to insure its speedy removal.

LA'SCARIS, CONSTANTINE, a descendant of the imperial family of that name, emigrated from Constantinople at the time of the Turkish conquest to Italy, where Francesco Sforza, duke of Milan, intrusted him with the education of his daughter Ippolita. Lascaris afterwards went to Rome and Naples, where he taught Greek and rhetoric. He died at Messina, towards the end of the 15th century, leaving his valuable MSS. to the municipal council of Messina. They were afterwards transferred by the Spaniards to the Escurial Library.

Lascaris published a Greek Grammar, Milan, 1476, which was translated into Latin, and went through several editions at Venice from the Aldine press, under the title of 'Compendium octo Orationis Partium,' &c.

LA'SCARIS, ANDREAS JOHANNES, of the same family, called Rhyndacenus, left Greece at the time of the Turkish conquest, and repaired to Florence, where Lorenzo de' Medici took him under his patronage, and sent him to Greece to collect valuable MSS., of which Lascaris brought back a considerable number to Italy. After the death of Lorenzo, Lascaris gave lessons in Greek at Paris. Budæus was one of his pupils. He died at Rome in 1535, being about ninety years of age. Lascaris published or edited, among others, the following Greek works :—'The Hymns of Callimachus,' with scholia ; 'Commentaries on Sophocles ;' a Greek Anthology, fol., 1494.

LASER, a highly esteemed gum-resin among the ancients, which had become rare even in the time of Pliny, but which is described by Theophrastus under the name of silphion. [SILPHIUM.]

LASERPI'TIUM (the name of the ancient Silphium), a genus of plants belonging to the natural order *Umbelliferæ*. *L. glabrum*, glabrous Laserwort, has roots which are filled with a gum-resin, which is acrid, bitter, and even somewhat caustic. It is said to be a violent purgative. *L. Siler* is a native of the mountains of the middle and south of Europe. The root is extremely bitter, and yields an aromatic resinous substance which has been supposed to be the Silphion or Laser of the ancients. [SILPHIUM.] Sibthorp found this plant in Greece.

LASSO, ORLANDO DI, was born in 1520, at Mons in Flanders, but was, on account of his fine voice, taken while a boy, by Ferdinand Gonzaga, to Sicily and Italy. Afterwards he taught singing at Rome. After some years spent in travelling, he proceeded to Munich, where he married. He died there in 1594, having long enjoyed a very high reputation.

His eldest son published a collection of his works, in seven volumes, under the title of 'Magnum Opus Musicum Orlandi de Lasso, complectens omnes Cantiones quas Motetas vulgo vocant a 2 ad 12 Voc.' &c.

LASTREA, a genus of Ferns, belonging to the tribe *Aspidieæ*. The following species are British —*L. Thelypteris* (Marsh Fern) ; *L. Oreopteris* (Sweet Mountain Fern) ; *L. Filix Mas* (Male Fern) ; *L. cristata ; L. rigida ;* and *L. dilatata.*

LATAKIA. [SYRIA.]

LATHE. [EARTHENWARE ; POTTERY ; TURNING.]

LATA'NIA, a genus of Palms of the tribe *Borassinæ* of Martius. *L. rubra*, remarkable for its red-coloured leaves, is a native of the Isle of France. *L. rubra* and *L. borbonica* are moderate sized, with all the leaves of a palmate fan shape. The leaves, like those of other palms, are employed by the natives for covering their huts, as well as for making fans and umbrellas. The leaf-stalks are split, and employed for making baskets, sieves, &c.

LATERAN, the name of a church, Basilica Lateranensis, with a palace and other buildings annexed to it, situated at the south-eastern extremity of Rome, near the walls of Aurelian and Honorius. This group of buildings is called 'in Laterano,' from being built on the estate once belonging to Plautius Lateranus. The later emperors had a palace on the spot, and Constantine had a church or chapel annexed to the palace. Constantine, or some of his successors, gave up the palace to the bishops of Rome, and the Lateran, till the beginning of the 14th century, was the residence of the popes. The Pope, in his quality of bishop of Rome, goes to take solemn possession of it after his election, and he officiates there on certain great festivals, for which reason it is styled the head church in the world, 'Ecclesiarum Urbis et Orbis Mater et Caput.'

A fire broke out in 1308, which consumed the greater part of the palace, as well as the church. The church was restored, but the palace was abandoned, and Gregory XI., when he transferred the papal see to Rome in 1377, fixed his residence in the Vatican palace, which then came to be considered as the residence of the pontiffs till the 17th century. Sixtus V. however in 1586 ordered a new palace (the present structure) to be built, adjoining the Lateran church.

LATIMER, HUGH, bishop of Worcester, the son of a farmer in Leicestershire, was born about 1472. He took a degree at Cambridge, previous to entering into holy orders. His 'heretical' opinions caused him to be prohibited by the Bishop of Ely from preaching within that diocese, an obstacle which he overcame by gaining the use of a pulpit in a monastery exempt from episcopal jurisdiction. Cromwell, the king's favourite, gave him a benefice in Wiltshire, where he preached reformed doctrines, and recommended him to Anne Boleyn, who appointed him her chaplain, and soon after the bishopric of Worcester was conferred on him (1535). He continued to preach these doctrines for three years, at the expiration of which the Act of the Six Articles was passed, from which he so totally dissented, that he resigned his bishopric.

Accusations were afterwards made against him for his objections to the Six Articles, and he was committed to the Tower. He remained a prisoner for six years ; and not until the accession of Edward VI. did he obtain his liberation, when he refused to accept the restoration to his see. Latimer was committed to the Tower soon after the accession of Mary. He steadfastly maintained his opinions, and Oct. 16, 1555, was led to the stake with Ridley, gunpowder being fastened about his body to hasten his death ; it took fire with the first flame, and he died immediately. Latimer published several of his sermons at different times. They have been reprinted in 2 vols. 8vo., London, 1825.

LATI'NI was the name of one of the oldest nations of Italy, who are said to have come down at some remote time, before the building of Rome, from the central Apennines, in the neighbourhood of Reáte (the modern Rieti), into the lower country between the Anio, the Tiber, the Alban Moun-

tains, and the sea, which was afterwards called Latium. These Latins appear to have formed their settlements in the lowlands, where they founded many towns—Laurentum, Lanuvium, Lavinium, Aricia, Gabii, Tusculum, Tibur, Præneste, Labicum, Collatia, Cora, and others. That there was a mixture of Grecian blood in the Latin race seems not to be doubted, and a comparison of the elementary parts of the Greek and Latin languages proves at least that those who used these tongues were sprung from or related to a common stock. The Latin communities were united by religious rites.

The Latini are described as a race robust, hardy, frugal, and warlike, and their early union with Rome, great part of whose population was recruited amongst them, contributed mainly to the growth and success of that republic. Their towns were strong, both by their position and their massive walls, traces of which still exist on the sites of ancient Præneste, Tusculum, and other places of dates anterior to Rome, and are ascribed by some to the Tyrrhenians, who preceded the Latini, and have been confounded with the Pelasgians. The foundation of Alba is involved in great obscurity, but the fact of its being an important town several centuries before the existence of Rome is undoubted. [Alba Longa.] Whether Alba was at the head of the Latin Confederation, or was the centre of another confederation distinct from that of the Latins, though connected with it, has been a matter of doubt. Niebuhr adopts the latter supposition. A distinction is made by Livy between the Albans and Latins. The dictator of Alba is not called the dictator of the Latins. The founders of Alba were either emigrants from Lavinium, who built a town and set up an independent state for themselves, according to Livy's story of Ascanius, or they were strangers, probably a tribe from the mountains, who built a new town, which in course of time ruled over part of Latium and sent colonies to Lavinium and other places on the coast which had become deserted. Alba is said to have ruled over thirty colonies, and a like number of thirty towns is mentioned as constituting the Latin Confederation in the Roman period.

Under Tullus Hostilius, the third Roman king, war broke out between Rome and Alba, which ended in the destruction of Alba and the removal of the inhabitants to Rome. In the following reign of Ancus Marcius, the first war of the Latins against Rome is mentioned: the result was that Politorium, Tellenæ, and Ficana were taken by the Romans, and the inhabitants transferred to Rome, where they were settled on Mount Aventine. Servius Tullius obtained, by agreement with the leaders of the Latin cities, what his predecessors could not obtain by force, namely, that the Latins should unite with the Romans in building a temple to Diana on the Aventine, to be common to both people. This was considered as an acknowledgment that Rome was the head of the Latin nation. Tarquinius Superbus, the last of the Roman kings, persuaded the Latins not only to renew the treaty with Rome, but to acknowledge him as their princeps, or chief, and to send their youth to serve no longer as auxiliaries, but mixed with the Romans in the same legion. Tarquinius also assumed the presidency of the Feriæ Latinæ, or festivals of the Latin state, which by an ancient usage were held once a year on the summit of the Alban Mount, and were dedicated to Jupiter Latiaris or Latialis; and he made these solemnities common to the Romans, the Latini, and the Hernici. Deputies from the three nations and from other allied districts attended, each bringing their victims. The sacrifices lasted three days, some say six, after which a 'visceratio,' or distribution of meat, took place among the deputies. These feriæ continued, bating some temporary interruptions, to be held down to the latest period of the Roman republic, and one of the two consuls always attended them. The history of the Latin cities, after the expulsion of the last king to their subjugation by the Romans, B.C. 337, is a part of the history of Rome. Some of the Latin towns had previously obtained the Roman citizenship, either complete, or in a limited degree.

During the Second Punic War Hannibal tried to work upon the feeling of dissatisfaction which existed among many of the Latins, as well as other nations of Italy which had been conquered by Rome; and accordingly, after the battles of Trebia and Thrasymene, he separated the Latin and Campanian from the Roman prisoners, and released the Latins without ransom. The Latins however, unlike the Campanians, Samnites, Hirpini, Lucanians, and others, who went over to Hannibal, remained faithful to Rome, whose armies were repeatedly recruited among them during that long and fearful contest.

The Latins remained for two centuries and a half in the same dependent condition, until the breaking out of the Social or Italian War. The tribune Livius Drusus proposed that the full Roman citizenship should be extended to them, as well as to the other nations of Italy, which had formed treaties of alliance with Rome. Drusus however was murdered, and his motion was dropped for a time. But when the Marsi, Samnites, Peligni, Campanians, and Lucanians rose in arms, and constituted themselves into a confederation, of which they made Corfinium the capital, and after they had defeated several Roman armies, the consul L. Julius Cæsar (B.C. 91) advised and obtained the passing of a law which gave the Roman franchise to all the people of Italy who were allies of Rome and had remained faithful in that emergency. This franchise, or civitas, is stated accordingly to have been granted to the 'socii,' or allies, who had furnished their contingents, and to the Latins, who are mentioned distinctly from the rest. By this grant the freemen of the Latin towns were placed so far on a level with the Roman citizens as to enjoy the full Roman franchise, to be admitted into the Roman rustic tribes, have votes, and be eligible to public offices. Thus the distinction between the Romans and the real or original Latins was obliterated.

LATITUDE. [Longitude and Latitude.]

LA'TIUM, the country of the ancient Latins had at first for its boundaries on the west the

Tiber, which divided it from Etruria; on the north, the Anio, which separated it from the Sabini; and, on the south, the Tyrrhenian Sea. To the east and south-east its boundaries on the side of the Volsci are not so clear. In the first period of Roman history the Latin territory does not seem to have extended to the eastward beyond the Alban Mount, nor beyond a line drawn from that point to the sea-coast, leaving outside of it Satricum, Corioli, and Antium, which in the earlier ages of the republic appear as Volscian towns. And yet in the first treaty with the Carthaginians, said to have been concluded soon after the expulsion of Tarquinius Superbus, Antium, Circeii, and Tarracina, or Anxur, are reckoned as towns of Latium. Præneste however and Tibur appear from the first as Latin towns, the former being the advanced post of Latium on the side of the Hernici, who inhabited the mountainous tract between the Trerus (Sacco), the Upper Anio, and the Liris. Tibur, also a town of the Latini, was divided by the Anio from the territory of the Sabini. But the boundary of the Latin territory seems to have crossed the Anio below Tibur, and to have extended across to the Tiber above the influx of the Allia, so as to include the towns of Nomentum and Crustumeria. Within these limits there was a great number of towns, some of which are mentioned in the article LATINI.

After the final conquest by Rome of the Volsci, the Hernici, and the Aurunci, the name of Latium was extended to the whole country inhabited by these three peoples, in addition to the country of the old Latins, and this was called Latium Novum. It extended to the eastward as far as the Liris, and included also a district on the left bank of that river, which once belonged to the Volsci, with the towns of Arpinum, Aquinum, Interamna, Atina, and Casinum. The other towns of this new Latium were Privernum, Tarracina, Amyclæ, Fundi, Caietæ, Formiæ, and, farther inland in the country of the Hernici, Anagnia, Ferentinum, Frusino, Verulæ, Aletrium, Signia, Fregillæ, and Fabrateria. Latium was in its extended sense bounded by Campania and Samnium to the east, by the Sabini to the north, the Tiber to the west, and the sea to the south. Under Augustus, Latium and Campania constituted the first of the eleven regions into which Italy was divided by that emperor.

The physical geography of Latium and the actual state of the country are given under CAMPAGNA DI ROMA, except the easternmost part of the new Latium, namely, the districts of Gaëta, and Sora, which belong to LAVORO, TERRA DI.

LATREILLE, PIERRE-ANDRE', was born at Brives, Nov. 29, 1762. He was sent to Paris in 1778, and placed in the college of the Cardinal Lemoine, to be educated for the church. He gained the friendship of Lamarck and other scientific men, and devoted himself particularly to entomological studies. At the Revolution, being an ecclesiastic, he was persecuted and condemned to banishment, but escaped this punishment through the influence of his scientific friends. In 1798, he was named a correspondent of the Institute, and eventually filled the vacant chair of zoology.

Latreille was elected a member of the Academy of Sciences in 1814, and was made in 1821 Chevalier of the Legion of Honour. He died at Paris, Feb. 6, 1833.

The number of his literary productions is very considerable. His memoirs, especially those upon the sacred insects of the Egyptians, and on the general geographical distribution of insects, excited considerable attention. Latreille's 'Précis des Caractères génériques des Insectes' (Brives, 1796), was the first work in which these animals were distributed in natural families, and it formed the basis of his 'Genera Crustaceorum et Insectorum' (Paris, 1806–1809, 4 vols. 8vo), which is by far the best of all his works.

LATROBITE occurs crystallised and massive. Primary form a doubly oblique prism. The colour is a pale red; the lustre vitreous; and the substance translucent. It consists mainly of silica and alumina.

LATTAKOU. [BETCHOUANA.]

LATTEN. [BRASS.]

LAUD, WILLIAM, was the son of a clothier at Reading in Berkshire, where he was born Oct. 7, 1573. He received his early education in the free grammar-school of Reading, whence, in July 1589, he was removed to Oxford, where he had the character of being 'at least very Popishly inclined.' In 1605 Laud had been appointed chaplain to Charles Lord Mountjoy, earl of Devonshire, on whose death, in 1608, he was appointed one of the chaplains of Neile, then bishop of Rochester. In 1611 he became president of St. John's College, Oxford. In 1616 king James conferred upon him the deanery of Gloucester, having some time previously appointed him one of his chaplains in ordinary. In 1617 he accompanied the king into Scotland for the purpose of modelling the Scottish Church. On Jan. 22, 1620, he was installed prebendary of Westminster, and Nov. 18, 1621, consecrated bishop of St. David's.

In May, 1622, the conference between Laud and Fisher the Jesuit took place. It was held in the presence of the Marquis of Buckingham, who shortly after, as Laud informs us, 'was pleased to enter upon a near respect to him, the particulars of which were not for paper.' On the 15th of June he became 'C.' to Buckingham. It is thus he writes it in his 'Diary:' Some suppose it to mean Chaplain; others, Confessor.

In 1626 Laud was made bishop of Bath and Wells, and dean of the Chapel Royal. In 1627 he was made a privy-councillor. On the 11th of July, 1628, he says, 'My congé deslier was signed by the king for the bishopric of London.'

On the death of Buckingham, Laud commenced his career of statesmanship with a zealous persecution of the Puritans, or religious sectarians. In 1630 he was chosen chancellor of the University of Oxford. In 1632 he obtained for his dependant, Francis Windebanke, the office of secretary of state; and in the same year Dr. Juxon was, he says in his 'Diary,' sworn dean of his majesty's closet—'that I might have one that I might trust near his majesty.'

Laud was appointed, Aug. 16, 1633, archbishop

of Canterbury; on Feb. 5, 1634, one of the great Committee of Trade and the King's Revenue; and on the death of Weston, lord high treasurer, the management of the treasury was committed by letters patent under the great seal to certain commissioners, of whom Laud was one. While in power, he lent his aid to most of the despotic measures of the king, and performed many arbitrary acts on his own account, by means of the infamous court known as the Star Chamber.

But the termination of Laud's career was approaching. On Nov. 18, 1637, a few weeks after the meeting of the Long Parliament, he was impeached of high treason by the House of Commons, and committed to the Tower. Of his trial he has himself written a full, and, on the whole, faithful account. ('History of his Troubles and Trial,' folio, London, 1695.) He defended himself throughout with courage and ability. The judges gave it to be understood that the charges contained no legal treason; whereupon the Commons changed the impeachment into an ordinance for his execution, to which the Lords assented. Laud produced a pardon from the king, which was disregarded. He was beheaded on the 10th of January, 1640-1.

LAUDANUM. [Opium.]

LAUENBURG. [Denmark; Schleswig.]

LAUGHARNE. [Caermarthenshire.]

LAUMONITE occurs crystallised and massive. Primary form an oblique rhombic prism. The colour is a reddish white, the lustre vitreous. It is translucent; and when heated at the blowpipe it gives a white enamel, which, by a continued heat, is converted into a transparent glass. It is a compound of silica, alumina, lime, and water.

LAUNCESTON. [Cornwall.]

LAURACEÆ, a natural order of apetalous Exogens, consisting entirely of trees and shrubs inhabiting the warmer parts of the world, and in most cases aromatic; on which account several are mentioned in works on officinal plants. The best known species in Europe is *Laurus nobilis*, the Sweet Bay, a beautiful evergreen, whose fragrant leaves are commonly employed to flavour confectionary. [Laurus.] Other products of the order are—cinnamon, cassia, sassafras, camphor, and other useful substances.

LAUREATE, POET, an officer in the lord-chamberlain's department of the royal household, from the Latin *laurus*, the bay. The earliest mention of a poet-laureate in England is in the reign of Edward IV. In the reign of Charles I., 1630, the first patent of this office appears to have been granted, which fixed the salary or pension attached to it at 100*l.* a year, with a tierce of canary wine. The succession of poets-laureate since the time of Charles II. has been—John Dryden, Nahum Tate, Nicholas Rowe, Laurence Eusden, Colley Cibber, William Whitehead, Thomas Warton, Henry James Pye, and Robert Southey. Mr. Wordsworth is the present holder of that distinction. A commutation of 27*l.* for the allowance of wine is now paid.

LAURINE, an acrid and bitter principle contained in the berries of the laurel. Its smell resembles that of laurel oil. It is insoluble in water. When heated, it melts, and volatilises without leaving any residue. The berries contain only about one per cent. of this substance.

LAURUS, a genus of the natural family of *Lauraceæ*, to which indeed it has given its name. It includes as a species one of the most celebrated trees of antiquity, and until recent times some of the most elegant and useful of the vegetable kingdom. They are now however placed in distinct genera. [Cassia; Cinnamomum.]

The Laurel, or Sweet Bay, now alone remains in the genus Laurus, and is the *L. nobilis* of Linnæus, a native of the north of Africa and south of Europe, and of Asia; at least it has been so long naturalised in these countries that it would be difficult to ascertain whence it was originally introduced. The Bay-Tree attains a height of 20 or 30 feet, and is cultivated in gardens, not only on account of its elegant appearance, but also for the aromatic fragrance of its leaves, which are ever green and quite smooth. The fruit is endowed with aromatic properties as well as the leaves, whence both have long been used in medicine as stimulants and carminatives, as well as a fatty oil expressed from the seed.

LAUSANNE, the capital of the Swiss canton of Vaud, is situated near the northern shore of the Lake of Geneva, on three steep hills, which project from Mont Jorat, and are separated by deep ravines. The situation of Lausanne is picturesque; but the interior of the town is far from pleasing, the streets being narrow, very steep, and ill paved. The cathedral, a vast Gothic structure of the 11th century, and the handsomest church in Switzerland, is adorned with a lofty tower, and also a spire 200 feet high. The church of St. François is also a very old building. The castle, formerly the residence of the bishop of Lausanne, now the council-house of the canton. The other remarkable buildings of Lausanne are—the college which contains a large library and a museum; the penitentiary; the charity-schools; and the casino or club-house. The town has 14,120 inhabitants. It has no manufactures of importance. The chief trade is in wine, the staple produce of the canton. The environs present very delightful scenery. Steamers from Geneva and other points on the lake put in daily at the suburb of Ouchy, which is built on the shore of the lake. The house inhabited by the historian Gibbon is still shown in Lausanne.

LAUSITZ (*Lusatia*), a circle in the kingdom of Saxony, is bounded N. by Prussian Saxony, E. by Silesia, S. by Bohemia, and W. by the Saxon circle of Dresden. Its area is 966 square miles, and its population in 1846 was 286,171, of whom 42,4[illegible] are Wends. It is covered in the south-east with mountains, which form the continuation of the Riesengebirge westwards, and send out numerous offsets into the other parts of the circle. The principal rivers are the Neisse, a feeder of the Oder in the south-east; the Spree in the centre, and the Elster in the north-west, which belong to the basin of the Elbe. The soil is sandy, and in general unproductive. The corn produced does not suffice for the home consumption. Flax, hemp, tobacco, &c., are grown. Horses, horned cattle, sheep, bees, and geese are very numerous. In

iron is found, and iron-mines are worked. Great quantities of turf are cut for fuel. Most of the inhabitants are engaged in manufacturing woollen cloth, hosiery, linen, cotton, leather, tobacco, &c. There are several iron forges and foundries.

This circle forms but a small portion of the former margraviate of Lausitz, which had an area of 4168 square miles, and was divided into Upper and Lower Lausitz. With the exception of the above circle, the margraviate was ceded to Prussia in 1815, and now forms part of the provinces of Prussian Saxony, Brandenburg, and Silesia.

The principal towns of the circle are—*Bautzen* [BAUTZEN]: *Ebersbach*, N.W. of Zittau, on the Spree, a place of 6000 inhabitants, with important linen manufactories: *Kamenz*, on the Schwarze-Elster, which has manufactures of woollen cloth, linen, and leather, and a population of 3844: *Gross-Schönau*, which stands on the Altwasser, and has 4600 inhabitants, who manufacture large quantities of damask: *Reichenau*, on the Bohemian frontier, which has 3570 inhabitants: *Hernnhut*, a few miles N. of Zittau, a small place of 1400 inhabitants, from which the sect of the evangelical brethren took the name of Hernnhutters: and *Zittau*, on the Altwasser or Mandau, a feeder of the Neisse, which is a large well-built walled town, with considerable linen and woollen manufactures, distilleries, breweries, paper-mills, dye-houses, and potteries; it has also a good commerce in flax, linen thread, and colonial products; a theatre, 8 churches, a gymnasium, a training-school for teachers, a public library, and 8520 inhabitants.

LAVA, in Geology, the most general designation of the mineral substances which are erupted in a melted state from volcanic vents. Lava, when observed as near as possible to the point from whence it issues, is for the most part a semifluid mass of the consistence of honey, but sometimes so liquid as to penetrate the fibre of wood. It soon cools externally, and therefore exhibits a rough unequal surface, but the internal mass remains liquid long after the portion exposed to the air has become solidified. The temperature at which it continues fluid is considerable enough to melt silver.

According to Von Buch, almost all lavas are to be viewed as a modification of trachyte, consisting essentially of felspar, and united with titaniferous iron; they generally contain glassy felspar, and often inclose augite, leucite, hornblende, mica, olivine, specular iron, and many other minerals, developed by crystallisation from the fused mass. Basalt, another of the characteristic volcanic rocks, contains, besides much felspar, a considerable admixture of augite or hornblende, and is rich in oxide of iron, sometimes titaniferous. About one-half of the weight of all lavas is silica: the other half consists of earthy and alkaline ingredients varying greatly in proportions.

The certainty with which the mineral ingredients of lava can be identified depends principally on the degree of crystallisation which circumstances have permitted. There is in lava every degree of variation, some specimens being of granitic, others of earthy, compact, resinous, or vitreous texture. According to conditions of solidification,—in water, in air, or in fissures of the earth,—the minerals which occur in lava are variously distributed; and the masses appear compact, porous, cellular, vesicular, cavernous, spumous, or filamentous.

LAVAL, the capital of the French department of Mayenne, is situated in 48° 4′ N. lat., 0° 46′ W. long., 152 miles W. by S. from Paris, and has 17,348 inhabitants. The principal part of the town stands on the slope of a hill, on the right bank of the Mayenne, and consists of irregularly built, narrow, steep, and crooked streets of dark timber-framed houses, each story of which overhangs the one below it, so that a considerable part of the buildings overhang and darken the dreary streets. From the midst of these dismal buildings, and close to the river, rises the extensive old castle of the lords of La-Tremouille, surmounted by a lofty round tower, which formed the keep; this castle is now used as a prison. Near the castle an old bridge thrown across the river leads to a new suburb, regularly built with wide straight streets, on the left bank of the river. Another suburb called Avenières is interesting on account of its elegant church, which dates from 1040. The principal buildings in the old town are—the churches of La-Trinité, des Cordéliers, and St. Vénérand; two hospitals, founded about the year 800; the public library; a large and handsome linen market. The town has a tribunal of first instance, a tribunal and chamber of commerce, and a college. It is the centre of a large manufacture of table and household linen and linen-yarn, for the sale of which there are weekly markets; calico, flannel, cotton handkerchiefs, serge, soap, leather, &c., are also made; and there is a good business done in flax, wine, brandy, clover-seed, timber, iron, marble, &c. Laval is a walled town; it was taken in 1793 by the Vendeans, who, in October of that year, under the command of Larochejacquelin, defeated with terrible slaughter a large army of republicans near the town. The railway now in course of construction from Paris to Brest passes through Laval. (*Dictionnaire de la France.*)

LAVA'NDULA SPICA, a native of southern Europe, of which there are two varieties, if not distinct species, termed *L. latifolia* and *L. angustifolia*. The former is also called Spike Lavender, and the oil which it yields differs considerably from the oil of *L. angustifolia*, or *L. vera*, and is termed Oil of Spike or foreign Oil of Lavender. This sort is much less fragrant and of a deeper green colour than the oil of the true lavender, and is merely used in painting, or to adulterate the genuine oil, which is so extensively employed in the preparation of perfumes. The flowers of the *L. angustifolia* are the parts employed in medicine.

LAVA'TER, JOHANN KASPAR, was born Nov. 15, 1741, at Zürich, where his father was a physician. He performed the duties of a preacher in his native town. In 1767 he published his admired 'Swiss Songs,' and in the following year his 'Aussichten in die Ewigkeit' ('Prospects of Eternity'). In 1769 he was made deacon of the

Orphan-house church at Zürich. His 'Physiognomic Fragments' appeared in 1775, in 4 vols. 4to. It is said that in after-life Lavater had less faith in physiognomy than at first. Lavater regarded the beginning of the French Revolution with satisfaction; but his opinions changed after the decapitation of the king. When, on September 26, 1799, Massena took Zürich, Lavater, who was busied in the streets exciting the Swiss soldiery and aiding the sufferers, was shot. He suffered a long time from this wound, and did not die till the beginning of 1801.

LAVATE'RA (in honour of the two Lavaters), a genus of plants belonging to the natural order *Malvaceæ*. *L. arborea* (Tree Mallow) is a native of Italy, Spain, Portugal, the north of Africa, and the Canary Islands, on maritime rocks; also in Britain, in the Isle of Wight, on Portland Island, in Cornwall, and Devonshire. It is the Μαλάχη of Theophrastus ('Hist. Pl.,' i. 5; i. 14).

None of the species of Lavatera are of any importance or value, except as ornamental plants. Many of them are hardy, easily cultivated, and well adapted for shrubberies. The greenhouse and frame species will thrive well in a mixture of loam and peat, or any light soil. They may be planted out during the summer against a south wall, and, if protected in the winter by a mat, will generally survive throughout the year. The perennial species grow in any kind of soil, and may be propagated either by dividing the plants at the root, or by seeds. The annual and biennial kinds should be sown in the open border during the spring. The species chiefly worth cultivation in gardens are *L. Olbia, flava, unguiculata, Neapolitana, Cretica, Lusitanica,* and *trimestris.*

LAVELANET. [Arie'ge.]

LAVENDER, the name of hoary, narrow-leaved, fragrant bushes, inhabiting the south of Europe, the Canaries, Barbary, Egypt, Persia, and the west of India, with generally blue flowers. Twelve species are described, of which two only are of general interest, namely, the common Lavender (*Lavandula vera*) and Spike Lavender (*L. spica*), both natives of sterile hills in the south of Europe and Barbary.

LAVER, a substance sometimes used as food, consists of the fronds of marine plants belonging to the genera *Porphyra* and *Ulva*. Common purple laver is furnished by *Porphyra laciniata* and *P. vulgaris,* two species common on rocks and stones in the sea on many parts of the British coast. They derive their botanical name from their beautiful purple or violet colour.

LAVOISIER, ANTOINE LAURENT, was born at Paris, Aug. 16, 1743. His father spared no expense in his education. When only twenty-one years of age, he obtained the prize offered by the government for the best essay on lighting the streets of Paris. In 1768 he was admitted an associate of the French Academy, and in 1769 obtained the appointment of one of the farmers-general of the revenue. He was afterwards appointed to superintend the numerous saltpetre-works of France.

During the Reign of Terror he was accused of having, as a farmer-general, mixed water and noxious ingredients with tobacco: he secreted himself for some days; but, hearing that his colleagues were imprisoned, he voluntarily surrendered, and was consigned to the guillotine May 8, 1794.

He was the author of nearly sixty memoirs printed in the 'Memoirs' of the Academy, and other periodicals. His principal separate works are: 'Opuscules Chimiques et Physiques,' 2 vols. 8vo. 1775; 'Traité Elémentaire de Chimie,' 2 vols. 8vo., 1789; 'Instructions sur les Nitrières et sur la Fabrication de Saltpêtre,' 8vo., 1777.

In a posthumous and incomplete publication consisting of two octavo volumes, entitled 'Mémoires de Chimie,' Lavoisier, alluding to the term commonly employed of the *French theory,* claims it entirely as his own. This theory overturned the *phlogistic* theory of Stahl [Chemistry, p. 455], which had assumed that a peculiar principle called phlogiston was the cause of all combustibility and all metallisation. The modern theory of combustion is mainly due to Lavoisier. His analysis and recombination of atmospheric air were ably conceived and executed. He was one of the chief means of bringing about the reformed nomenclature of chemistry. But Lavoisier made more claims to originality than he was able to support. Professor Brande has justly said of him that, 'though a great architect in the science he laboured but little in the quarry; his materials were chiefly shaped to his hand, and his skill was displayed in their arrangement and combination.'

LAVO'RO, TERRA DI, a province of the kingdom of Naples, corresponding to the greater part of the ancient Campania, is bounded N. by Abruzzo, E. by Sannio and Principato-Ultra, S. by the provinces of Naples and Principato-Citra, and W. by the Mediterranean and the Campagna di-Roma. The province extends between the lower ridge of the Apennines, the Mediterranean, and the mountains which encircle the Bay of Naples. The area is 2493 square miles, and the population in 1845 was 721,971. It is divided into five districts:—1. The plain of *Nola* in the south-east, which looks like an immense grove of tall elms and poplars planted in rows to support the vines which grow at their feet, and which twist around them, and hang in festoons from tree to tree. Between the rows corn and pulse are sown. The soil is a rich sandy loam. 2. West of Nola is the district of *Caserta,* which includes the central part of Campania, and is watered by the Volturno. The plains of Caserta and Capua near the mountains are tolerably healthy, well cultivated, and extremely productive; but the plain of the Volturno, from Capua to the sea, is very unhealthy: it is chiefly occupied by herds of horses and cattle. A range of hills, the *Massicus* of the ancients, here divides the basin of the Volturno from that of the Liris or Garigliano. 3. The district of *Gaëta,* which includes the lower valley of the Liris and the plain of Fondi. The low lands of the Garigliano are unhealthy and desolate, but where the Formian Hills stretch near the coast the country is healthy, fruitful, and well cultivated. The plain of Fondi is very unhealthy, owing to a stagnant lake near that town. 4.

district of *Piedimonte*, which occupies the valley of the Upper Volturno to beyond Venatro, and as far as the great chain of the Apennines of Abruzzo. This part of the country is healthier. The low lands produce wheat and maize, and the lower slopes of the mountains are planted with the olive, while the higher grounds afford pasture or are covered with chestnut-trees. 5. The district of *Sora*, which embraces the valley of the Upper Liris. This is in great measure a mountainous district, cold in winter, and partaking of the nature and climate of Abruzzo. These five districts are divided into 230 comuni or parishes. Good organzine and sewing silk are made in Caserta; cotton and woollens at Piedimonte; common woollen cloth at Arpino; and there are extensive tanneries at Santa Maria di Capua.

The capital *Caserta* is the residence of the intendente or governor of the province, and of the civil and criminal courts; it has 12,000 inhabitants, and is remarkable for the adjoining palace and gardens, which form one of the most magnificent royal residences in Europe. *Nola*, a very old town and a bishop's see, with 9000 inhabitants, contains several churches and convents, and extensive barracks. *Maddaloni*, a pretty town at the foot of the mountains, has a royal college and 10,000 inhabitants. *Capua*. [CAPUA.] *Santa-Maria-di-Capua* has 9000 inhabitants, and a considerable inland trade. *Aversa*. [AVERSA.] *Piedimonte*, a modern town N. of Capua, is well built; the inhabitants amount to 10,000. *Venafro*, on the high road to Abruzzo, in a country abounding with olives, has 3000 inhabitants. *Cajazzo*, population 5000. *San-Germano*, a modern town with 5000 inhabitants, is situated on the road leading to Rome by the valley of the Sacco, a feeder of the Liris. The monastery of Monte-Casino is on a steep hill above San-Germano. *Sora*, higher up the Liris, at the foot of the Apennines, is a bishop's see, and has 7000 inhabitants. *Isola-di-Sora*, in an island of the Liris, which forms a fine cascade above it, has 3000 inhabitants, who manufacture paper, iron, wire, and cloth. *Arpino*. [ARPINO.] *Aquino*. [AQUINO.] *Atina*, situated among the mountains, has 8000 inhabitants and many antiquities. *Sessa*, on a hill not far from the high road to Rome, has 4000 inhabitants, several churches and convents, and some remains of antiquity. *Teano*, once the capital of the Sidicini, has 4000 inhabitants, a cathedral, and seminary. *Gaeta*. [GAETA.] *Fondi*, a bishop's see and a frontier town, near the borders of the Papal State, in a fertile but unhealthy plain, has 5000 inhabitants, and some remains of Cyclopean walls. The ancient Via Appia, with its old pavement, forms the principal street of the town.

In the valley of the Liris is the town of *Pontecorvo*, which, with a small territory, surrounded on all sides by the Terra-di-Lavoro, belongs to the Pope; it has a population of 6500 inhabitants.

(*Quadro Statistico del Regno delle Due Sicilie, par* G. Quattromani, 1845; Serristori, *Saggio Statistico.*)

LAW. A law (*lex*) has been defined to be a command or rule of the supreme power in a state addressed to all the members of a given community, who owe obedience to such supreme power. To make it efficient there must be some sanction, or penalty, or punishment, or means of enforcing obedience to it. All the laws of any given country may be comprehended under the term the Law of such country; though the term law, as will be presently explained, comprehends more than all the laws (*leges*), properly so called, of any given country; for it comprehends those rules of Law which are not laws or statutes. The law that exists in any given country is called the Positive Law of that country: it is so called simply as being or existing, as placed or fixed.

The word law is used in various senses. The Law of God is the law that he has given to us in the constitution of our nature, and also the Law which he has revealed through Jesus Christ. God's moral government of the world is discoverable by the exercise of our reason and of our moral faculties, the chief and most pre-eminent of which is conscience. We thus learn that man's nature is adapted to certain courses of action, and not to others; by which we mean that some courses of action are contrary to man's nature, when viewed in all its parts, and as governed by the supremacy of conscience, and that other courses of action are conformable to his nature. We learn that perfect happiness is not attainable by man, and that the greatest degree of happiness, if we look at the whole of mankind and not to single instances, is acquired by doing that which we know that we ought to do, or, as it is expressed, by doing our duty. Our duty comprehends our duty to God and our duty towards one another: our duty to one another implies the existence of society, which we cannot conceive as not existing. Society, therefore, is an ordinance of God, and so are the rules by which society is governed; yet not all rules that may exist, for there are many rules in all societies which are contrary to God's law: but rules or laws are one of the modes of God's government of the world.

These rules, in countries where the Christian religion is known and accepted, are the law of God as revealed to us. They do not form a body of rules adapted to all the wants of society, and were not designed to supersede such rules as man can and does frame by virtue of his intellectual and moral activity developed in a social state. But all rules of human constitution, by which we mean rules not founded directly on revealed religion, are bad rules if they contradict any principle or rule of the Christian religion, which to those nations which accept it is the supreme law, the sanction of which law in this world is the evil consequences to individuals and societies of their violation of it, and in the next world punishment. In countries where the Christian religion has not been received, or in those ages in which it was not known, the rules of morality have been deduced from those principles of reason and that moral sense which all men possess as part of their nature; and the rules of law, or the systems of law in such countries and in such ages, have always had some degree of conformity to natural religion, or that knowledge of our duties which

man may attain to without the aid of revelation: they have been admitted to some degree at least as the test and standard of all positive law.

As society exists and must exist, there is a necessity for law, quite independent of religion or of morality; and the true nature of law is only understood when we have formed a clear conception of the several provinces of law and of morality. The object or end of law is sometimes said to be the promotion of the happiness of a community; but this is not true. Law cannot make people happy. If it be said that its object is not to make happiness, but to assist to that end, this is no more than saying that it does something towards enabling people to be happy, if they know how to avail themselves of its advantages. What is really meant by the ill-chosen expression of the greatest happiness being the end of social institutions, is, that it is the object of government and of law to secure to all the members of society those things which are means towards the enjoyment of as much happiness as we are capable of, but which things do not of necessity make us either virtuous or happy. They may have just the contrary effect.

The object of law is to secure individual freedom, which is accomplished by the absolute duties which are imposed upon all. The foundation of liberty or freedom is therefore obedience to positive law. Not that obedience will always secure freedom, for the power which exacts obedience may be tyrannical; but without obedience to one power there can be no freedom in a community. The freedom which it is the object of law to secure—which it does secure in some degree in all countries, though often very imperfectly—is the freedom of living such a life as is conformable to the end of our being; to live according to Nature, as this is explained by Marcus Antoninus, Epictetus, and Butler, or, in the words of St. Paul, 'to lead a quiet and peaceable life in all godliness and honesty.'

If the Christian rules of life were followed in all their strictness by all mankind, government and law would still be necessary; which consideration further shows that government and law, not particular forms of government and particular forms of law, but government and law generally are part of God's means by which he governs the world. Man can acquire nothing except by labour: he thus obtains dominion over external things, which he fashions and forms to use; hence the necessity of rules which shall fix the nature of property and the numerous questions that may arise concerning it. And, if we should suppose that a time may come when men shall seek less than they do now the appropriation of things to their several use, we cannot conceive any state of society in which rules as to Ownership shall not be necessary. Man also interchanges the products of his industry, and makes agreements as to the various transactions of life, which are capable of almost infinite diversity both as to form and substance. Accordingly rules are necessary to regulate such agreements, to settle in some way many things which are matters of indifference in themselves, but not matters of indifference so far as they must be settled some way or other, and to determine disputes whenever disputes may arise, as they may do even between people of strict integrity. Thus the matter for a second set of rules is formed, those that relate to Contracts, and also to Obligations which arise otherwise than by contract. The union of male and female for permanent cohabitation in itself requires no determination by law, for the union is founded simply on consent between persons of competent age to live together for life in such form and manner as religion or the morality of the particular country may prescribe. But still rules of law are required to regulate many things in the relation of husband and wife, mainly with reference to property and contracts; and rules of law are also required to regulate the relations between parent and child with respect to property. The different degrees of consanguinity which are the result of marriage have been established for two purposes, to prevent marriages being contracted within certain degrees of consanguinity, and to regulate the distribution of property in cases of intestacy. When a man dies, his personality ceases, and that property which during his lifetime had a distinct character, by being viewed as attached to the owner's personality, would be left without an owner by his death. But rules of law give the owner a power of disposing of this property, in anticipation of death, by a testament, and in case of intestacy they determine the persons to whom it shall go. These four divisions comprehend what the Romans viewed as belonging to the department of Privatum Jus, and it is a department of law which exists by the same necessity that society does. It is not directly concerned about morality in any degree; a man may acquire property for immoral purposes or use it immorally. His conduct in the matter is beyond the province of law, so far as simply concerns the use that he makes of his property. Marriage may not be such a union as accomplishes the end of marriage; but it is still regulated by law so far as the regulation of law is necessary and possible, and no further.

Besides the department of Private Law, there is the department that concerns government and administration, the limits of which it is difficult to define; and accordingly this is the department in which the rules of law most frequently extend beyond their proper limits. Criminal Law belongs to this department; and also, properly considered, all judicial procedure.

The origin of law, like that of society, is unknown. The original law of any state exists in the form of immemorial custom, which has long been recognised by the supreme power, or by those to whom the supreme power has delegated the function of declaring what is law. These customs are not called laws, but Customs, Rules of Law, and the like. But there is in all society a constant growth of law produced by new circumstances and new wants; and this is the matter which society furnishes to the judge, and which within certain limits he may declare to be law as the occasion arises. The judge does not make this law: he accepts it, and declares it to be law. In the case of laws properly so called (*leges*)

statutes, or acts of parliament, the judge has to interpret the law; but he adds nothing, if he does his duty—he merely declares the rule of the law-maker or legislator, as well as he is able to ascertain it.

That part of law which is originally declared in writing by the supreme power, or by any persons to whom this power is delegated, is sometimes called Written Law. An act of parliament is an example of this kind of law. That law the original of which is not in writing, though writing may be the evidence of its existence, is called Unwritten Law. Such is Customary Law, or law generated by custom.

Law is sometimes divided into Law and Equity, the nature of the opposition of which is explained under EQUITY.

The department of Jus Privatum may be distributed into the Law which relates to Persons and the Law which relates to Things; a division established by the Romans. The Law which relates to Persons views them as holding a certain condition or status, independent of their simple personality, and their capacities, incapacities, and duties, simply as living persons. The law which concerns the relations of husband and wife, parent and child, and some others, merely as such relations, is an instance; and this is the only part of Jus Privatum which belongs to the law of persons. The Law of Things of necessity concerns persons, but in relations of a different kind. It views persons, not as holding a certain status or condition, but simply as persons who have certain capacities and rights, are subject to certain incapacities, and owe certain duties, the objects of which are material things, either directly or indirectly. It therefore comprehends the Law of Property, of Obligations, of Testaments, and of Intestacy.

The Law of Persons comprehends not only what has been described as included under Privatum Jus, but also every other particular status or condition with which persons may be invested, when not considered simply as persons, but as having peculiar powers or rights and duties. Accordingly, the law of persons, thus viewed, comprehends all those who hold public functions of any description, as judges, sheriffs, and all people employed in administration or government. As opposed to this class of persons called Public, all other classes of persons may be called Private.

Law may be, or is sometimes, divided into Civil and Criminal. In the Roman system *Jus Civile* was the peculiar law of Rome as opposed to all other law; and sometimes when we speak of the Civil Law we mean the Roman law as received in Europe. In the English system the term Civil Law, as opposed to Criminal, is ill-defined. The distinction, in fact, is only made with reference to procedure, and then only in a limited degree. If a man brings an action to recover a piece of land that belongs to him and is held by another, or if he brings an action to recover a debt, the proceeding is a civil proceeding; but this is not what is meant by the opposition of civil and criminal. If a man sustains an injury from another, by which he acquires a right of action for damages or compensation, a right solely founded on the wrong, his remedy is a civil proceeding. If the proceeding against the wrongdoer is not for compensation or damages, but merely to bring him to punishment, it is a criminal proceeding. There is also a division of law that may be called Penal in the English system, where the proceeding is of a nature to enforce a penalty, part of which may go to the person who brings the action, and part to the crown. Criminal proceedings are appropriately enough called Pleas of the Crown in the English system, because the proceedings are in the name of the crown, though private persons may as a general rule prefer a bill of indictment.

That law which is now commonly called International Law, or the Law of Nations, is not properly law. The nature of this so-called law is explained in the article INTERNATIONAL LAW.

Various uses of the term Law, not explained here, are explained in the article 'Law,' in the 'Penny Cyclopædia.'

As to the term CODIFICATION, see LEGISLATION.

LAW, CRIMINAL. The professed object of Criminal Law is the prevention of crimes by the terror of punishment. A crime is such an act or omission as makes the person who is guilty of the act or of the omission liable to a punishment or penalty provided by law. If the act or omission is such that some particular person or persons, who are injured by the act or the omission, can legally obtain compensation from the person who has injured them, the act or omission is called a civil injury. Thus the nature and object of the legal procedure make the distinction between Crime and Civil Injury. Viewed as immoral acts, many civil injuries are worse than many crimes. But such acts or omissions for which the law affords redress only have in England been usually denominated civil injuries as contradistinguished from crimes.

Crimes, according to the English law, are divisible into two great classes, which depend upon the mode of proceeding peculiar to each.

1st. Such as are punishable on indictment or information (the Common Law methods of proceeding).

2ndly. Such as are punishable on summary conviction before a justice or justices of the peace or other authorised persons, without the intervention of a jury (a mode of proceeding derived entirely from special Statutory Enactments).

Offences punishable on Indictment or Information.

Indictable offences are distributable into four classes or divisions: Treasons, Præmunires, Felonies, and Misdemeanors. Persons who commit the offences which constitute the last-mentioned division may also be prosecuted by criminal information instead of being indicted.

The distinction between these classes is, for the most part, a merely arbitrary one; the consequence of which is, that offences in their nature wholly undistinguishable are, in many instances, separated and subjected to punishments widely disproportionate, and to forms of procedure widely dissimilar. In fact, the only real distinguishing

feature between one class of crimes and another, at the present day, is to be found in certain peculiarities of punishment and procedure incident to each. Formerly however the classes of crimes were marked by distinctive characteristics; but they have subsequently, either by artificial constructions of the courts or by legislative enactment, been made to embrace offences of a very different nature from those originally included within them. For instance, the crime of treason, whether high or petit, implied a violation of the allegiance due from an inferior to a superior. In the case of high treason, so called 'by way of eminent distinction,' it was the violation of the allegiance due from a subject to his liege lord and sovereign; and in case of petit treason, which was limited to the murder of a husband by his wife, a master by his servant, or an ecclesiastic by his inferior, who owed him faith and obedience, it was the breach of the allegiance of private and domestic faith*.

The characteristic above pointed out can no longer be traced in many of the various constructive treasons which have been created by the courts. It will be sufficient here to give a single illustration of the mode in which the law of treason has been stretched to reach cases totally inconsistent with its original design. By one of the clauses of the Statute of Treasons (25 Edw. III. c. 2) it is declared to be treason *to levy war against the king*. A riotous assembly attempting by force to redress a public grievance, as, for example, to pull down *all* inclosures, or to burn *all* meeting-houses, has been held to be *a levying of war* within the meaning of this clause, although there has been no direct intention or design whatever against either the state or the person of the king. This construction is said to depend upon the *generality* of the design. If the intention be to pull down *particular* inclosures or meeting-houses only, the offence is a mere riot, and in quality a simple misdemeanor. Although the generality of the design may be a reason for awarding a higher punishment in the former than in the latter case, there appears to be no reason for construing an offence, which but for such generality would be a misdemeanor only, to amount to the crime of treason in levying war against the king. The Criminal Law Commissioners (4th, 5th, and 6th Reports) have recommended that this offence should no longer be considered to fall within the Statute of Treasons. They propose that the only assemblings or risings of the people which should amount to a levying of war against the king should be such as are against the person of the king, or against any army or force appointed by him, in opposition to his authority, or with intent to do him bodily harm, or impose any restraint upon his person, or to depose him, or to dispossess or deprive him of any portion of his dominions or regal authority, or with intent by force or constraint to compel him to change his measures or counsels, or to put any force or constraint upon or to intimidate or overawe both houses or either house of parliament; and that no assembling or rising of the people should by reason of any illegality or generality of purpose be deemed to be a levying of war against the king, unless it be with one or other of the several intentions before mentioned. Such riotous and tumultuous meetings as have no such intention in view they recommend should be denominated felonies or misdemeanors merely, according to the circumstances by which they are attended.

Again, the term 'Præmunire' was originally applied to offences which consisted in the introduction of any foreign jurisdiction, more especially the authority of the See of Rome, into the kingdom, but has subsequently, to use the language of Mr. Serjeant Hawkins ('Pleas of the Crown,' b. 1, c. 19), 'been applied to other heinous crimes, for the most part having relation to the offences originally coming under the notion of præmunire, but in some instances none at all.' The Habeas Corpus Act (31 Car. II. c. 12) contains an instance of the latter mode of application. By the 12th section of that act it is made a Præmunire to send any inhabitant of England, Wales, or the town of Berwick-upon-Tweed, a prisoner beyond the seas in defiance of its provisions to the contrary.

The term 'Præmunire' was adopted from the first word of the original writ on which the subsequent proceedings were founded: '*Præmunire* (for *præmoneri*) *facias* A. B. quod sit coram nobis,' &c. The Criminal Law Commissioners propose to abolish præmunires as a class of crimes. (7th Report.)

The crime of felony had its origin in very remote times, and was founded upon feudal principles. Its incidents were not formerly, as they are now, of a merely arbitrary nature, annexed to certain criminal acts without reference to any principle. The crime originally consisted in a violation of the feudal contract by the misconduct of the lord or of the tenant, and, where committed by the tenant, occasioned as a consequence the forfeiture of his feud to the lord.

Those crimes, therefore, which induced such forfeiture, and, by a small deflection from the original sense, those which induced the forfeiture of goods also, were denominated felonies; and afterwards by long use the term *felony* came to signify the actual crime itself, and not the penal consequence. 'So that, upon the whole,' to use the words of Blackstone (4 'Comm.,' p. 95), 'the only adequate definition of felony seems to be that which is before laid down, viz., an offence which occasions a total forfeiture of either lands or goods, or both, at the common law; and to which capital or other punishment may be superadded according to the degree of guilt. Where the punishment is less than capital, the offender loses his goods only; where capital, his lands as well as his goods. The crimes which occasioned such forfeiture were originally, with one or two exceptions, capital; but at the present day there are offences for which no greater punishment can be inflicted than imprisonment for a term not exceeding three years, which are felonies, and consequently occasion the forfeitu

* Petit Treason was abolished by the 9 Geo. IV. c. 31, s. 2, and the offences constituting it declared to be murder only.

of all the offender's goods and chattels; whilst other crimes, for which the punishment may be transportation for fourteen years, and in one instance *must* be for life, are misdemeanors only, and work no forfeiture. It is apparent from this that the present law is very defective, and that the amount of punishment is no longer the test of distinction between a felony and misdemeanor. It is proposed by the Criminal Law Commissioners (7th Report, p. 16) to remedy this by making the liability to transportation the test of distinction, *i. e.*, that all offences liable to a less punishment than transportation should be misdemeanors only.

The term 'Misdemeanor' is used in the English system of Criminal Law to denote such indictable offences as are of a lower degree than felony.

We shall now point out the peculiarities of punishment which distinguish one class of crimes from another at the present day. In order to this, the penal consequences incident to the whole body of offences constituting each class will be first stated, and then in what respects those consequences differ from each other. The classes will be taken in the same order as above.

1. *Treasons.* — Treasons, with one exception mentioned below, are capital; but, whether capital or not, the offender, *upon conviction*, forfeits to the crown the personal estate of every description, whether in action or possession, or settled by way of trust, which the offender has otherwise than as an executor, or a trustee, or a mortgagee (4 & 5 Wm. IV. c. 23, s. 3), at the time of conviction: and in the case of capital treasons, *upon attainder by judgment of death or outlawry*, the blood of the offender is corrupted, but not so as to obstruct descents to such offender's posterity, when they are obliged to derive a title through such offender to a remoter ancestor (3 & 4 Wm. IV. c. 106, s. 10); and all the freehold lands and tenements of inheritance in fee-simple or fee-tail, and all other hereditaments (except copyholds), whether in possession, reversion, or remainder; and all the rights of entry on freehold lands and tenements which the offender has, otherwise than as a trustee or mortgagee (4 & 5 Wm. IV. c. 28, s. 3), at the time of the offence committed, or at any time afterwards, and also the profits of all freehold lands and tenements which the offender has in his or her own right for life, so long as such interest shall subsist, and, if the offender be a male, his wife's dower, are forfeited to the crown; and all the copyhold estates belonging to the offender at the time of the offence committed are forfeited to the lord of the manor. The above penal consequences are general to all capital treasons, unless, as is sometimes the case, the act which creates the particular treason expressly exempts from some of them. The before-mentioned non-capital treason renders the party guilty of it liable to those only of the above consequences which accrue upon conviction, since the others follow only upon the party's being attainted, that is, sentenced to death or outlawed; which latter, in the case of capital treasons and felonies, is of the same effect as being sentenced to death. The existence of this non-capital treason would appear to be the result of inadvertence. By the Forgery Consolidation Act (11 Geo. IV. & 1 Wm. IV. c. 66), it was declared to be treason and punishable with death to forge the great and other royal seals and the sign manual. By the 2 & 3 Wm. IV. c. 123, the punishment of death was repealed for forgery in all but the two cases of wills and powers of attorney to transfer stock (it has been since taken away in these cases also by the 7 Wm. IV. & 1 Vic. c. 84); but the *quality* of the offences enumerated in the Forgery Consolidation Act was left without alteration; so that to forge the royal seals, &c., would appear to be still treason, though no longer a capital offence.

The judgment of death in the case of treason is that the offender, if a male, be drawn on a hurdle to the place of execution, and be there hanged by the neck until dead; and that afterwards the head be severed from the body of such offender, and the body be divided into four quarters, to be disposed of as her Majesty shall think fit (54 Geo. III. c. 146); and, if a female, that the offender be drawn to the place of execution, and be there hanged by the neck until dead (30 Geo. III. c. 48. s. 1). The queen however may, by warrant under her sign-manual, countersigned by a principal secretary of state, direct, where the offender is a male, that he shall not be drawn, but taken in such manner as in the warrant shall be expressed to the place of execution, and that he shall not be hanged, but be beheaded, whilst alive, instead. (54 Geo. III. c. 146, s. 2.)

2. *Præmunires.*—The penalties of præmunire, as shortly summed up by Sir Edward Coke (1 Inst. 130 a.), are, 'that from the conviction the defendant shall be out of the king's protection, and his lands and tenements' (*i.e.* in fee-simple or for life, but not in tail, beyond his life interest therein), 'goods and chattels, forfeited to the king; and that his body shall remain in prison at the king's pleasure, or, as other authorities have it, during life.' These penalties were first imposed by the Stat. 16 Rich. II. c. 5 (commonly called the Statute of Præmunire); and it is by reference to that statute that all subsequent præmunires have been made punishable. It was formerly supposed that a person convicted of præmunire, being put out of the king's protection, might be killed with impunity as being the king's enemy; but by the 5 Eliz. c. 1, ss. 21 and 22, it was enacted that it should not be lawful to kill any person attainted in a præmunire, saving such pains of death or other hurt or punishment as theretofore might, without danger of law, be done upon persons sending or bringing into the realm, &c. any process, &c. from the See of Rome. Præmunires, although they occasion a forfeiture of the offender's lands and goods, are not felonies. To constitute a felony, the offence must have worked a forfeiture at the common law; but in the case of præmunire the forfeiture is made a part of the punishment by statute merely, which is not sufficient.

3. *Felonies.* — All felonies, as stated above, were originally, with one or two exceptions, punishable with death; but the offender, unless

the felony was excluded from the benefit of clergy, was entitled, for a first offence, to be discharged from the capital punishment upon praying that benefit. [Benefit of Clergy.] But now, since the passing of the 7 & 8 Geo. IV. c. 28, no felony is punishable with death unless it was excluded from the benefit of the clergy before or on the 14th Nov., 1826, or has been or shall be made punishable with death by some statute passed since that day. Where not capital, felonies are punishable either in the manner prescribed by the statute or statutes specially relating to such felonies, or, where no punishment has been or may hereafter be specially provided, with transportation for seven years, or imprisonment for any term not exceeding two years, with the addition, if the court shall think fit, of whipping, where the offender is a male, hard labour and solitary confinement, or any of them. (7 & 8 Geo. IV. c. 28, ss. 7 and 8.) Such confinement must not however be for a longer period than one month at a time, or three months in a year. (7 Will. IV. & 1 Vict. c. 90, s. 5.) In the case of *all* felonies, whether capital or not, the offender immediately *on conviction* forfeits to the crown all the personal estate of every description, whether in action or possession, or settled by way of trust, which he has otherwise than as an executor, or a trustee or mortgagee (4 & 5 Will. IV. c. 23, s. 3), at the time of conviction, and in the case of all capital felonies, *upon attainder by judgment of death or outlawry*, forfeits to the crown the profits of all estates of freehold, and of things not lying in tenure, and to the lord of the manor the profits of all estates of copyhold, which the offender has, otherwise than as a trustee or mortgagee (4 & 5 Will. IV. c. 23, s. 3), at the time of the offence committed, during his life; and his blood is corrupted (but not so as to obstruct descents to the posterity of such offender where they are obliged to derive a title through him to a remoter ancestor (3 & 4 Will. IV. c. 106, s. 10), and after his death his copyholds which he holds in fee-simple are forfeited to the lord of the manor. And also, in the case of murder, all his freehold lands and tenements in fee-simple escheat (subject to what is called the crown's year, day and waste) to the lord of the fee. (54 Geo. III. c. 145; Co.-Litt. 391 a.; 4 Black. 'Comm.' 385.)

The judgment of death in the case of all capital felonies, except murder, is that the offender be hanged by the neck until dead (2 Hale's 'P.C.' 411); and, in the case of murder, it is the same, with the addition that the offender's body shall be buried within the precincts of the prison in which he shall have been confined after conviction. (2 & 3 Will. IV. c. 75, s. 16; 4 & 5 Will. IV. c. 26.) The court however is empowered, if it shall think that the offender is a fit subject to be recommended to the royal mercy, to abstain from pronouncing judgment of death upon him, and to order such judgment to be entered of record instead; and the judgment so recorded has the same effect as if pronounced and the party were reprieved. (4 Geo. IV. c. 48, ss. 1 and 2; 6 & 7 Will. IV. c. 30, s. 2.)*

* See R. v. Hogg, 2 M. & Ro 391, where it was held that, since the passing of the 6 & 7 Wm. IV. c. 30, death may be recorded in the case of murder as well as other capital felonies, notwithstanding the exception contained in the 4 Geo. IV. c. 48.

4. *Misdemeanors.*—The punishment in the case of misdemeanors, where none is specially provided by statute, is generally fine and imprisonment.

It thus appears that the circumstance, so far as punishment is concerned, which distinguishes misdemeanors from all the other classes of offences, is the absence of forfeiture as a necessary consequence of conviction. The distinction between præmunires and felonies (which term, it should be remarked, in its largest sense, includes treasons, on account of the forfeiture which that class of crimes occasions) is, that the forfeiture which ensues upon a conviction of the former is, as before observed, in pursuance of statutable provisions; whereas in the latter case it is a common-law consequence of the offence, and follows as a matter of course whenever a crime is declared to be a felony. There appears to be no distinction as regards punishment, independently of special statutable enactment, between non-capital felonies (the term is used here in its ordinary restricted sense) and the non-capital treason above described; but the difference between felonies and treasons when punishable with death is very considerable. In the case of felonies the offender upon attainder *forfeits* to the crown the profits only of such freehold and copyhold lands as he had at the time of committing the offence, during his life, and after his death, his copyholds in fee-simple are forfeited to the lord of the manor; and, even where attainted of murder though his freehold estates in fee-simple fail after his death, it is not as a consequence of the law of forfeiture, but because they escheat for want of heirs capable of succeeding to them, owing to his blood being corrupted by the attainder; and it is on account of such estates escheating and not being forfeited that they go to the lord of the fee (that is, subject to the crown's year, day and waste), and not to the crown, unless there appears to be no intermediate lord between the offender and the crown, in which event the crown takes as ultimate lord of the fee. In the case of treason however the offender upon attainder, instead of forfeiting to the crown the profits merely of such freehold lands as he had at the time of committing the offence, during his life, forfeits all freehold estates of inheritance, as well those in fee-tail as those in fee-simple, and not only such as he had at the time of the commission of the offence, but those also which he may acquire at any time afterwards; and instead of forfeiting to the crown the profits of his copyholds during his life, and to the lord of the manor his copyholds in fee-simple only, he forfeits at once to the lord of the manor *all* the copyholds belonging to him at the time the offence was committed. Where the offender is a male, his wife's dower is also forfeited to the crown, which is not the case in felony. It is to be observed that the crown is now empowered (see 59 Geo. III. c. 94) to restore the whole or any part of any lands or hereditaments to which it becomes entitled by escheat or forfeiture to the family of the offender,—a provision which has

greatly mitigated the harshness of the law of forfeiture. The Criminal Law Commissioners however recommend the entire abolition of the confiscation of property as a necessary incident to convictions for treason or felony. ('7th Report on Criminal Law.')

According to the law of England, all persons above the age of seven years, except such as by reason of unripeness, weakness, unsoundness, disease, or delusion of mind, are incapable of discerning, at the time they do an act, that the act is contrary either to the law of God or the law of the land, are criminally responsible for such act; but temporary incapacity wilfully incurred by intoxication or other means is no excuse. An infant of the age of seven and under fourteen years however is to be presumed to be incapable of committing a crime until the contrary be proved. Duress, also, inducing a well-grounded fear of death or grievous bodily harm, will excuse a person acting under such duress in all cases except treason and murder; and a married woman committing any offence, except those last-mentioned, if her husband be present at the time, shall be presumed to have acted under his coercion, and be entitled to an acquittal, unless it appear that she did not so act. A married woman also shall not be liable to conviction for receiving her husband or any other person in his presence and by his authority.

The following provisions are of general application. By the Stat. 7 Will. IV. and 1 Vict. c. 90, s. 5, it is enacted that no court shall direct any offender to be kept in solitary confinement for any longer period than one month at a time or than three months in the space of one year.

By the Stat. 7 Will. IV. and 1 Vict. c. 85, s. 11, power is given to the jury on the trial of any person for any felony whatever, where the crime charged shall include an assault against the person, to acquit of the felony, and to find a verdict of guilty of assault against the person indicted, if the evidence shall warrant such finding; and thereupon the court may imprison the person so found guilty of an assault for any term not exceeding three years, with or without hard labour or solitary confinement, or with both.

By the Stat. 1 Geo. IV. c. 57, s. 3, it is provided that, where the punishment of whipping on *female* offenders formed, before the passing of that act, the whole or part of the sentence to be pronounced, the court may pass sentence of confinement to hard labour for any time not exceeding six months nor less than one month, or of solitary confinement, in lieu of the sentence of being whipped. In all cases therefore where whipping is mentioned to be part of the punishment, without its being restricted to males, the above provision operates.

By the 3 & 4 Vict. c. 111, made perpetual by 5 & 6 Vict. c. 85, members of joint-stock or other banking companies, consisting of more than six persons, committing offences against or with intent to injure or defraud such co-partnerships, are made liable to the same punishments as if they had not been or were not members of such co-partnerships.

The following Treasons are punishable with death*.

1. Compassing the death of the king (which term includes a queen regnant) or of his queen, or their eldest son and heir; violating the king's companion (*i. e.* his wife) during the coverture, or the king's eldest daughter unmarried, or the wife of the king's eldest son and heir; levying war against the king in his realm, or being adherent to the king's enemies in his realm, giving them aid and comfort in the realm or elsewhere, and being thereof attainted of open deed; or slaying the chancellor, treasurer, or the king's justices of the one bench or the other; justices in eyre or justices of assize, or any other justices assigned to hear and determine, being in their places doing their offices†. (25 Edw. III. st. 5, c. 2.)

2. Endeavouring to prevent the person next in succession to the crown, according to the Acts of Settlement, from succeeding thereto. (1 Anne, st. 2, c. 17, s. 3.)

3. Affirming, by writing or printing, that any other person has a right to the crown otherwise than according to the Acts of Settlement and the Acts for the Union of England and Scotland; or that the crown, with the authority of parliament, is unable to limit the descent of the crown. (6 Anne, c. 7, s. 1.)

4. Compassing or intending the death or destruction, or any bodily harm tending to death or destruction, maim or wounding, imprisonment or restraint, of the person of the king; or to deprive or depose him from the crown; or to levy war against him, within the realm, in order to compel him to change his measures or counsels, or in order to overawe the parliament; or to move any foreigner to invade any of the British dominions; such compassing or intention being expressed by publishing some printing or writing, or by some overt act or deed. (36 Geo. III. c. 7, s. 1, made perpetual by 57 Geo. III. c. 6.)

5. Being married to or being concerned in procuring the marriage of any issue of her present majesty whilst such issue are under eighteen (in case the crown shall have descended to any such before that age), without the consent in writing of the regent and the assent of both Houses of parliament. (3 & 4 Vict. c. 52, s. 4.)

6. Knowing any person to have committed any of the before-mentioned capital treasons, receiving, relieving, comforting, or assisting him, or aiding his escape from custody.

Besides the last-mentioned offence, there also existed till quite recently several other capital treasons relating to the See of Rome; but these were repealed by the 7 & 8 Vict. c. 102.

The following Treason (the one already alluded to) is punishable with transportation for life or

* To conceal or keep secret any treason committed or intended to be committed is termed misprison of treason, and is punishable with loss of the profits of lands during life, forfeiture of goods, and imprisonment for life. (See 1 & 2 Phil. and Mary, c. 10, s. 8.)

† By the 11 Hen. VII. c. 1, it is enacted that no person who attends upon *the king for the time being*, in his person, and does him true and faithful service of allegiance, or is in other places by his commandment, in his wars, in this land or without, shall for such deed and true allegiance be convicted or attainted of treason.

not less than seven years, or with imprisonment for any term not exceeding four nor less than two years, with or without hard labour or solitary confinement, or with both, viz.:—

1. Forgery of the great seal, her majesty's privy seal, any privy signet of her majesty, the royal sign-manual, the seals appointed to be used in Scotland, and the great and privy seals of Ireland. (11 Geo. IV. and 1 Wm. IV. c. 66, s. 2; 2 & 3 Wm. IV. c. 123; 3 & 4 Wm. IV. c. 44, s. 3; 7 Wm. IV. and 1 Vict. c. 84, ss. 2 and 3.)

The following are the offences coming under the denomination of Præmunires:—

1. Derogating from the queen's courts. (27 Edw. III. stat. 1, c. 1, s. 1.)

2. Deans and chapters omitting to elect a bishop; and archbishops or bishops to consecrate the person so elected, after receiving the queen's congé d'élire. (25 Hen. VIII. c. 20, s. 7; repealed by 1 & 2 Philip and Mary, c. 8, and revived by 1 Eliz. c. 7.)

3. Molesting the possessors of abbey-lands contrary to the provisions of 1 & 2 Philip and Mary, c. 8. (1 & 2 Phil. and Mary, c. 8, s. 40.)

4. Obtaining any stay of proceedings, other than by arrest of judgment or writ of error, in suits for monopolies. (21 Jac. I. c. 3, s. 4.)

5. Procuring any stay of proceedings, other than by the authority of the court, in actions brought against persons for making provision or purveyance for the crown. (12 Car. II. c. 24, s. 14.)

6. Asserting, maliciously and advisedly, by speaking or writing, that both or either house of parliament has a legislative authority without the crown. (13 Car. II. c. 1, s. 3.)

7. Sending any subject of the realm a prisoner beyond the seas in defiance of the Habeas Corpus Act. (31 Car. II. c. 2, s. 12.)

8. Asserting, maliciously and directly, by preaching, teaching, or advised speaking, that any person, other than according to the Acts of Settlement and Union, has any right to the throne of these kingdoms, or that the queen and parliament cannot make laws to limit the descent of the crown. (6 Anne, c. 7, s. 2.)

9. Knowingly and wilfully solemnising, assisting, or being present at, any marriage forbidden by the Royal Marriage Act. (12 Geo. III. c. 11, s. 3.)

The following Felonies are punishable with *death*, viz.:—

1. Destroying ships of war or her majesty's arsenals, dockyards, naval, military or victualling stores, or other ammunition of war, &c. (12 Geo. III. c. 24, s. 1.)

2. Murder. (9 Geo. IV. c. 31, s. 3.)

3. Unnatural offences. (9 Geo. IV. c. 31, s. 15.)

4. Attempts to murder by administering poison, or by wounding, or by any other means where bodily injury dangerous to life is caused. (7 Wm. IV. and 1 Vict. c. 85, s. 2.)

5. Burglary, aggravated by striking an inmate. (7 Wm. IV. and 1 Vict. c. 86, s. 2.)

6. Robbery, aggravated by wounding the person robbed. (7 Wm. IV. and 1 Vict. c. 87, s. 2.)

7. Piracy, aggravated by endangering the life of any person on board of the vessel in respect of which the piracy is committed. (7 Wm. IV. and 1 Vict. c. 88, s. 4.)

8. Setting fire to a dwelling-house, any person being therein. (7 Wm. IV. and 1 Vict. c. 89, s. 2.)

9. Destroying vessels with intent to murder, or whereby human life is endangered. (7 Wm. IV. and 1 Vict. c. 89, s. 4.)

10. Exhibiting false lights, &c., with intent to bring ships into danger, or unlawfully doing anything tending to the destruction of ships in distress. (7 Wm. IV. and 1 Vict. c. 89, s. 5.)

Besides the above offences, that of wilfully and without lawful excuse having or being possessed of any forged stamp used in pursuance of any act relating to any duties on gold or silver plate made or wrought in Great Britain, for the purpose of marking or stamping such plate, appears to be still punishable with death.

That offence is contained in 55 Geo. III. c. 185, s. 7, by virtue of which enactment it was formerly also a capital crime to forge or utter the stamps provided for marking any such plate, or to fraudulently remove such stamps from one piece of such plate to another, or privately and secretly to use such stamps with intent to defraud the king. The punishment of death for these last-mentioned offences was repealed however by 11 Geo. IV. and 1 Wm. IV. c. 66, s. 1 (as to the forging and uttering), and by 4 & 5 Vict. c. 56, s. 1 (as to the removing and fraudulently using); but by some inadvertence (for it is clear that it can never have been intended) the offence of being possessed, without lawful excuse, of forged stamps for marking gold or silver plate (the least criminal of all the acts specified in 55 Geo. III. c. 185, s. 7) is still left capital.

The punishments of other felonies are transportation and imprisonment. A list of them, arranged according to the punishments, is given in the 'Penny Cyclopædia,' Law, Criminal, which article contains also the punishments of misdemeanors.

The whole Criminal Law of England, as regards indictable crimes and their punishments, has been collected and reduced into one body by the Criminal Law Commissioners (see their 7th Report), and is thus for the first time rendered accessible to the public at large. Before this reduction the Criminal Law had to be sought for in an immense mass of statutes, reported decisions, records, ancient and modern, and text-books, and, on that account, could be known but to the few, and those principally engaged in the practice or administration of the law. The digest so prepared by the Commissioners, and called by them 'The Act of Crimes and Punishments,' is comprised in twenty-four chapters.

Upon the subject of punishments, the Commissioners recommend the abolition of forfeiture as an incident to convictions for treason or felony; are inclined to reject whipping as a mode of punishment, except in the case of discharging or aiming fire-arms, &c. at the queen (5 & 6 Vict. c. 51, s. 2), in which it has been imposed by the legis-

lature as constituting a signal mark of ignominy; propose that three, or at the utmost four, years should be the longest term of imprisonment to be inflicted for any offence, whether treason, felony, or misdemeanor, in cases where imprisonment forms the whole or part of the punishment; and suggest a scale of penalties, consisting of forty-five classes, to be substituted for the numerous punishments contained in the above statement.—This scale might be much further reduced but for the special nature of some offences, and if the recommendations of the Commissioners should be adopted. At present it is extremely difficult in some instances to determine what punishment an offence is liable to.

It may be expected that at no distant period the 'Act of Crimes and Punishments,' subject to such omissions as are recommended by the Commissioners, will become the law of the land. There is also a Report containing a digest of the law of procedure as regards indictable offences (a difficult and laborious undertaking), which, if passed into a law, would be a work of inestimable value.

LAW, JOHN, of Lauriston, was born about the year 1681 at Edinburgh, in which city his father was a goldsmith. In early life he was engaged to arrange the revenue accounts of Scotland. After wasting some years in gaming and dissipation on the Continent, Law went to Paris, where he ingratiated himself with the regent duke of Orleans. By the persuasion of Law the first public bank of circulation was established by the regent in 1716, and its management was intrusted to the projector. This bank obtained the privilege for twenty years of issuing notes, which however were to be exchangeable on demand for coin. With the view of inducing the public to purchase the bank shares, the Mississippi Company was formed, with a capital of 100 millions of livres, and allied to the bank. Such numbers crowded forward to make investments in the stock of this Company, that the stock rose in price to 2050 per cent., and 150 millions of livres were added to the capital. In the midst of a vast amount of speculation, and the negotiation of large loans to the government, a royal *arrêt* appeared, which suddenly produced an entire revulsion in the public feeling. Under the pretence of a previous depreciation of the value of the coin, it was by this arrêt declared necessary to reduce the nominal value of bank-notes to one-half, and of the shares of the India or Mississippi Company from 9000 to 5000 livres. The consequence was that the bank-notes could no longer be circulated at more than one-tenth of their nominal value, and, though the arrêt was speedily revoked, the result was that the bank stopped payment. By these proceedings many thousands of families were suddenly reduced to indigence; and Law was obliged to quit France with the wreck of the fortune he might at one time have realised. He resided for some time in different places in Germany, and settled at Venice, where he died in 1729.

In 'A Discourse upon Money and Trade,' which he wrote and published in Scotland, Law has left a record of the views which led him to his financial schemes.

LAW, WILLIAM, was born in 1686 in Northamptonshire, went to Cambridge with a view of entering the church; took the degrees of B.A. and M.A.; and was in 1711 elected a fellow of Emanuel College. On the accession of George I. he refused to take the prescribed oaths, and in consequence vacated his fellowship. It was soon after this that he entered the family of Mr. Gibbon, who resided at Putney, and whose son, the historian, has communicated nearly all that is known of Mr. Law in his fragments of autobiography. Miss Hester Gibbon, sister of the historian, with her friend Mrs. Elizabeth Hutcheson, retired from the world to lead a life of charity and piety, and Mr. Law became their chaplain. King's Cliff, the place of Mr. Law's birth, was the spot to which they retired; and there Mr. Law lived the last twenty years of his life, dying April 9, 1761.

Mr. Law was the author of various works, in which he recommends the exercise of a piety which approaches to the character of ascetic. The most popular of them is entitled 'A Serious Call to a Devout and Holy Life.'

LAW, EDMUND, D.D., bishop of Carlisle, born 1703, was the son of a clergyman in the northern part of Lancashire. He was elected Fellow of Christ's College, Cambridge, and in 1737 was presented to the rectory of Graystock in Cumberland, which was followed by further preferment. His first work was his translation of Archbishop King's 'Essay on the Origin of Evil,' with copious notes. This was soon followed by his 'Enquiry into the Ideas of Space and Time,' &c. Both these works were produced before he left Cambridge; but it was in his retirement at Salkeld that he prepared his 'Considerations on the Theory of Religion,' with 'Reflections on the Life and Character of Christ.' In 1768 he was appointed to the bishopric of Carlisle; in 1777 he published his edition of the works of Locke; and he died in 1787.

LAW-MERCHANT. [Lex Mercatoria.]

LAWES, HENRY, was a native most probably of Salisbury, of which cathedral his father was a vicar-choral, and was born in the year 1600. In 1625 Lawes was appointed one of the gentlemen of the chapel, and afterwards clerk of the cheque to Charles I. In 1633, in conjunction with Simon Ives, he produced the music to a mask presented at Whitehall by the members of the four Inns of Court. About the same time he composed the music to Milton's 'Comus,' which was performed at Ludlow Castle in 1634. A great many of the effusions of the contemporary poets and persons of rank are to be found set to music by him in his three sets of 'Ayres and Dialogues for One, Two, and Three Voices,' published in 1653, 1655, and 1669.

Lawes continued in the service of Charles till the king's death. At the Restoration he resumed his places in the chapel-royal, and composed the anthem for the coronation of Charles II. He died in 1662, and his remains were deposited in Westminster Abbey.

LAWES, WILLIAM, brother of the preceding, was educated under the same master, and for a time

also held the situation of gentleman of the chapel. During the civil wars he entered the royalist army, and held the rank of captain. He disdained the office of commissary, which was offered to him with a view to his personal safety, and was killed at the siege of Chester in 1645. The king was much affected by his loss, and even went into mourning.

William Lawes was an able musician; he composed much for voices and instruments, as well as many excellent part-songs, rounds, &c., which are to be found in the publications of the day. His chief work is a collection of Psalms for three voices, set to the well-known paraphrase by Sandys.

LAWN, a space of ground covered with grass, kept short by mowing, and generally situated in front of a house or mansion.

Previous to laying down, the ground intended for a lawn should be properly trenched and drained, in order that such trees and shrubs as may afterwards be planted upon it should succeed well. After trenching, the soil should be allowed to subside, and the geatest care should be taken to make the surface perfectly even, otherwise a great expense will be afterwards incurred by the loss of time in mowing, which can neither be so quickly nor so well performed where the surface is uneven.

If turf can be readily procured, a lawn is at once produced; and by such means a more uniform distribution of grass may be obtained than by any other means. The surface of a well-fed meadow, or of an old common, closely cropped by sheep and geese, affords the best kind of turf; and, if any tall or coarse grasses should be mixed with it, no inconvenience will arise, for everything of this sort will eventually disappear under close mowing; and such only as are dwarf and suited to the soil will ultimately remain. Where a turf is to be produced by sowing, the seeds of such species as are indigenous to the locality, and possess at the same time the property of being dwarf and fine, are to be preferred; but, in the event of this method of forming a lawn being adopted, it is always desirable that a narrow slip of good turf should be carried all round the circumference.

Lawns, when once established, require only to be kept neat by the ordinary routine of rolling, mowing, and sweeping, except keeping the surface perfectly even by filling up small hollows with screened mould early in spring.

LAWRENCE, ST. [Canada.]

LAWRENCE, SIR THOMAS, was born in April or May 1769, at Bristol. His father had been brought up to the legal profession, but, having contracted what the world calls an improvident marriage with a beautiful and accomplished young lady, daughter of the Rev. W. Read, vicar of Tenbury, he became, after some changes of employment, landlord of the Black Bear Inn at Devizes, where he remained until 1779, when he failed, and went to Weymouth, whence in 1782 he removed to Bath, and placed his son for a time as a pupil under Mr. Hoare, a crayon painter. At the age of thirteen young Lawrence received from the Society of Arts the great silver pallet, with an additional present of five guineas, for a copy in crayons of Raphael's 'Transfiguration.' In 1787 Lawrence's father brought his son to London, and took apartments in Leicester Square. In the same year he first exhibited at Somerset House, where seven of his pictures, all female portraits, were admitted. From that time his fame and his practice rapidly increased. In 1791 he was chosen associate of the Royal Academy. In 1792 George III. appointed him to succeed Sir Joshua Reynolds as principal painter in ordinary, and the Dilettanti Society unanimously chose him for their painter.

In 1815 he was knighted, and in 1818 he proceeded to the congress of Aix-la-Chapelle, thence to Vienna, and in 1819 to Rome, where his portraits of Pope Pius and of Cardinal Gonsalvi were greatly admired. The collection of portraits of the warriors and statesmen most prominent in the establishment of peace, executed in obedience to the royal commission, is now in the Waterloo Hall, Windsor Castle.

In March 1828, Sir Thomas was chosen president of the Royal Academy. He died in London, Jan. 7, 1830. He was never married.

LAWSO'NIA, a genus of plants of the natural family *Lythrariæ*, which, consisting of only one or two species, may be found in most Oriental regions in gardens or in field cultivation. *L. inermis* is said by Oriental travellers to be used by the Asiatic women in dyeing their nails and the tips of their fingers, as well as the soles of their feet, of an orange hue. It is also used by the men for dyeing their beards, the orange colour being afterwards converted to a deep black by the application of indigo. The Arabic name of the plant is *Henna*.

LAYBACH. [Illyria.]

LAYERING is an operation by which the propagation of plants is effected by laying down or bending the shoots, so that a portion of them can be covered with earth. A shoot so operated on is called a *layer*, and the plant which furnishes the layers bears the name of *stool*.

The part of the shoot intended to form a layer should be divested of leaves where it is to be covered with the mould, and a slit should be made on the bent part, or the branch should be twisted half round at the bend so as to disarrange the woody tissue, or the bark should be half or three quarters *ringed:* the shoot is then fixed down by pegs or hooked sticks, cut down to within an inch or so of the ground, and covered with good mould, which must afterwards be kept tolerably moist. In general, roots are emitted in a few weeks, and by the end of a season young plants are obtained quite fit for transplantation. Some plants however require to be left for two years on the stools before they are removed, and there are some which can hardly be made to root at all in this manner.

LAZARETTO (in Italian *Lazzeretto*), is the name given to a building or inclosure which is annexed to seaport towns, chiefly in the Mediterranean, for the purpose of keeping confined therein the crews of ships and passengers arriving from places where a contagious disease is known to prevail. The persons thus confined are said to be in *Quarantine*, from the Italian word *quaranta*, 'forty,' because the period of confinement for those arriving from

actually infected places is forty days; after which, if no one has fallen ill, they are set at liberty. The name 'lazzeretto' is derived from Lazarus.

LAZIAN MOUNTAINS. [ANATOLIA.]

LA'ZULITE, *Lapis Lazuli*, occurs crystalline and massive. Primary form of the crystal a cube, but occurs in imbedded rhombic dodecahedrons. Hardness, 5.5 to 6. Colour, azure and different shades of blue; streak, paler blue. Translucent, opaque. Specific gravity, 2.76 to 2.94.

Massive variety amorphous, sometimes in grains, imbedded. Fuses on charcoal, when pure, into a white glass. It is brought from Persia and China, and is employed in the manufacture of *Ultramarine*. It consists of—phosphoric acid, 41.81; alumina, 35.73; magnesia, 9.34; silica, 2.10; protoxide of iron, 2.64; water, 6.06.

LAZZARONI. [NAPLES.]

LEA, River. [ESSEX; HERTFORDSHIRE.]

LEACH, WILLIAM ELFORD, was born at or near Plymouth, in Devonshire, in the year 1790. He graduated as a physician, but devoted himself to the study of zoology. In 1813 he was appointed one of the curators of the natural history department in the British Museum, which situation he held until 1821, when his career was cut short by the loss of his health and reason. After a residence abroad, and a long suspension of his studies, he in a great measure regained his mental faculties. He died in Italy of cholera, Aug. 25, 1836, at the age of 46.

We are chiefly indebted to Dr. Leach for the first introduction into this country of a natural system of arrangement in conchology and entomology. Besides various papers in the 'Linnæan Transactions' and 'Philosophical Transactions,' he wrote 'Malacostraca Podophthalma Britanniæ,' London, 1815–16; the 'Zoological Miscellany,' 1814 to 1817; and several articles in Brewster's 'Encyclopædia' and the 'Dictionnaire des Sciences Naturelles.'

LEAD is a metal of a blueish gray colour, and of considerable brilliancy when fresh surfaces are formed by cutting. If it has not been cooled too rapidly, it is so soft that, even when in pieces of considerable thickness, it may be easily bent. It soils slightly, and leaves on paper or cloth a mark after friction resembling that of plumbago. Its specific gravity is 11.4. Lead may be reduced to thin laminæ; but its tenacity is extremely slight, so that a wire about $\frac{1}{10}$th of an inch in diameter breaks with a weight of 30 pounds. It fuses at about 612°, and when slowly cooled crystallises in octohedrons. It is not a volatile metal, for in close vessels it may be heated to whiteness without subliming. When exposed to the air, it absorbs oxygen and carbonic acid slowly, and acquires a superficial coating of carbonate of lead. If it be exposed to air and water, it is oxidised and converted into carbonate of lead with considerable rapidity; this carbonate has the appearance of minute shining brilliant scales. Though at common temperatures lead is slowly acted upon by the oxygen of the air, it is readily oxidised when the heat is raised.

ORES OF LEAD.—The ores of lead, strictly speaking, are few in number. Indeed the only one which can properly be considered as a working ore is the Sulphuret, but there are various combinations of lead occurring in nature, of which we shall give a brief account.

Native Lead.—This is of very rare occurrence; it is found in small globular masses, imbedded in galena, or sulphuret of lead, and a slaggy substance, accompanied with blende and crystals of quartz. *Protoxide of Lead, Native Massicot*, occurs in brittle, dull, opaque, yellowish masses, which melt readily by the blow-pipe. *Deutoxide of Lead, Native Red Lead, Native Minium*, is a dull red earthy substance, which is reduced to the metallic state by the blow-pipe. *Chloride of Lead, Cotunnia, Cotunnite*, occurs in small pearly crystals, which are easily fusible and soluble. *Dichloride of Lead, Berzelite*, occurs in crystalline masses, with a fibrous and radiated structure, on earthy black ore of manganese. *Sulphuret of Lead, Galena.* This almost universally diffused ore occurs in attached *crystals* and *massive*. Primary form the cube. The crystals are opaque and leaden gray. The massive varieties have a granular structure. By the blow-pipe on charcoal the sulphur is first dissipated, and then metallic lead is obtained. In Cornwall and Scotland the veins of this ore traverse primary rocks. In Derbyshire it occurs in veins or beds in transition rocks. It very commonly contains a considerable portion of silver. *Seleniuret of Lead* occurs in granular masses, opaque, and of a blueish lead colour.

Having described the principal native binary compounds of lead, we proceed to notice those which are composed of an *acid* and *oxide of lead*, remarking that it is the *protoxide* only which combines with acids.

Carbonate of Lead occurs crystallised and massive. Primary form a right rhombic prism; brittle; grayish colour; and translucent. It occurs in most lead-mines, and is sometimes used as an ore of lead. *Sulphate of Lead* occurs in right rhombic prisms, variously tinted, and translucent. *Phosphate of Lead, Pyromorphite*, commonly occurs in hexagonal prisms; variously coloured, resinous lustre, and translucent. *Arseniate of Lead, Gorlandite*, occurs in hexagonal prismatic crystals, yellowish and translucent. *Chromate of Lead* is a rhombic prismatic crystal, reddish coloured, and translucent. *Molybdate of Lead*, or *Carinthite*, is a prismatic crystal of various colours, translucent, and having a resinous lustre. *Tungstate of Lead*, is a prismatic crystal, with a conchoidal fracture, a yellowish colour, a resinous lustre, and translucent. *Vanadiate of Lead*, or *Johnstonite*, occurs in rhomboidal crystals, brittle, yellowish, and opaque.

We now proceed to mention some artificial compounds and salts of lead, confining our description to such as are most curious in a scientific point of view, or most useful in the arts.

There are four compounds of *Oxygen* and *Lead*. *Suboxide of Lead* is a dark-gray powder, not soluble in acids, but resolved by them into protoxide and metallic lead. It consists of $L^2\ O^1$. *Binoxide of Lead* is an insoluble brown powder. It is decomposed by the action of light, by a strong heat, and also by being converted into

protoxide by lead and oxygen. It consists of $L^1 O^2$. *Protoxide of Lead*, or *Massicot* ($L^1 O^1$); and *Deutoxide of Lead*, or *Minium* ($L^3 O^4$), have been mentioned among the ores of lead.

Chloride of Lead is a colourless somewhat crystalline powder, which melts by the application of heat, and assumes on cooling a horny appearance, whence it was formerly called Horn Lead. It is sparingly soluble in water, and consists of $L^1 Chl^1$. *Oxichloride of Lead* is used as a pigment by the name of Patent Yellow; it consists of oxide of lead ^{0}, chlorine^1, and is a yellowish crystalline subtance. *Sulphuret of Lead* may be formed by melting a mixture of sulphur and lead-filings; in appearance it very much much resembles lead, and is composed of $L^1 S^1$. *Iodide of Lead* is a yellow powder, sparingly soluble in boiling water, and separates, on cooling, in brilliant flakes. It consists of $L^1 I^1$. *Carbonate of Lead* is very largely employed as a pigment under the name of *White Lead*, or *Ceruse*, from the Latin name *Cerussa*. Various processes are adopted for its preparation; the oldest (which is still preferred by many manufacturers) is that of exposing sheet-lead to the action of the vapour of vinegar, in earthen pots, heated by tanners' spent bark. It is a dense white powder, composed of lead^1, carbonic acid^1. *Nitrate of Lead* is a colourless solution, which by evaporation yields colourless octohedral crystals. They decrepitate when heated moderately, and if strongly heated they are decomposed; they consist of oxide of lead^1, acid^1. *Sulphate of Lead* is a dense white substance, insoluble in water; it consists of oxide of lead^1, acid^1. *Phosphate of Lead* is also a white insoluble powder; but, unlike the sulphate, it dissolves readily in dilute nitric acid. *Acetate of Lead*, frequently called Sugar of Lead, is very largely employed for various purposes. It is prepared by dissolving litharge in acetic acid, and evaporating the solution to its crystallising point. The crystals are generally minute and prismatic; they are colourless, nearly inodorous, and have a sweetish astringent taste. They consist of acetic acid^1, oxide of lead^1, water^3. When this salt is boiled in water with an equivalent of oxide of lead, diacetate of lead is formed, which is used in medicine under the name of Goulard's Extract of Lead. *Chromate of Lead* is largely employed as a pigment. It is of a beautiful yellow colour.

Of the *alloys* of lead, three are of some importance. Alloyed with antimony, lead forms *Type-metal; Pewter* consists of about 80 parts tin and 20 lead. Equal parts of tin and lead form *Plumbers' Solder*.

History, Manufacture, and Trade.—Lead was known to and used by the Greeks and Romans for various purposes. Among others it was employed for pipes to convey water, just as it is now. The lead-mines of this island were worked by the Romans. The chief of them are in Cornwall, Devonshire, Somersetshire, Derbyshire, Durham, Lancashire, Cumberland, Westmorland, Shropshire, Flintshire, Denbighshire, Merionethshire, and Montgomeryshire; in Scotland, in Dumfriesshire, Lanarkshire, Ayrshire, and Argyleshire. Lead is also found in Ireland, in the counties of Armagh, Wexford, Wicklow, Waterford, Clare, and Down.

The ore of lead, when extracted from the mine, is called *Galena*, and is combined with various earthy matters. The first processes subsequent to its extraction are those of crushing or pounding and washing the ore. The ore is then smelted, sometimes in a common smelting-furnace and sometimes in a reverberatory furnace; and the melted metal is allowed to run into a large iron pan, from which it is ladled into cast-iron moulds. It then constitutes what is called Pig-Lead. In this state lead always contains more or less of silver. The proportion is sometimes exceedingly minute, varying from 1 to 30 ounces in a ton of lead. The extraction of the silver is always performed when it exists in a proportion sufficient to pay the expense of the process, which varies in different localities according to the cost of fuel. The process of extraction, which is called refining, depends upon the well-known circumstance, that lead, when heated to redness, absorbs a large portion of oxygen from the air, and is converted into an oxide, while silver does not undergo any such change, but retains its metallic form at almost any temperature. Mr. Pattinson, of Newcastle, has introduced an improved process, in which the crystallising properties of melted lead are brought into requisition.

The most extensive use of lead is in the form of sheets, and pipes, or tubes, for the passage of liquids. To make sheet-lead, the pigs are brought to a state of fusion in a large pot or cistern, near to which is placed the table on which the sheet is to be cast. This table, which is usually from 18 to 20 feet long and six feet wide, is made either of wood or cast iron. The wooden table has its surface protected by a layer of fine sand, which is wetted and spread evenly and firmly over it before the melted lead is poured on. To prevent the lead from running over the sides, a ledge is provided, two or three inches thick, and two inches high, which forms the margin of the table. An instrument called a strike is also provided to regulate the thickness of the sheet, and to spread the melted metal evenly over the table. In casting the sheet the fused metal is taken from the cistern with an iron ladle, an put into a triangular-shaped iron shovel or peel, placed at the head of the table, which peel being raised so as to pour out the lead upon the table, the strike is brought into use to spread it evenly over the whole surface, the surplus, if any, falling into a vessel placed for its reception at the foot of the table. A sheet of lead weighs 9 cwts., so that its length and breadth will be greater in proportion to the diminution of its thickness. The thickness of sheets of lead is frequently reduced by means of heavy rollers worked by steam power. Rolled sheet-lead is made by the repeated compression between steel rollers, of a block of lead several inches in thickness.

Lead pipes are sometimes made, when great exactness of shape is not required, by bending a length of sheet lead of the necessary width over a mandril, and soldering the edges together; but the more usual method of manufacture is by cast

ing and drawing. The casting-box employed is an iron cylinder made in two parts, and put together longitudinally with flanges; inside of this cylinder is placed an iron rod or core, which is so fixed as to be concentric to the cylinder, without touching it; a space is thus left, into which the melted lead is poured. When this is set, the core is removed, and the cylinder opened, so as to withdraw the pipe, which is much thicker than is needed, and must be lengthened, while its substance is reduced, by drawing it through a succession of holes in steel plates, diminishing gradually in diameter.

In the making of lead shot, the lead is alloyed with a small portion of arsenic, and is melted in a furnace. Close to the furnace is placed a large colander, or perforated plate, into which a portion of the scoria produced in melting the metal is placed, and then the metal is ladled into it. Being somewhat detained by the scoria, it is partially cooled and divided into separate portions, which pass through the colander in the form of globules, which follow in such rapid succession as to have the appearance, to a cursory observer, of a continued stream. These globules fall into a tub of water placed on the lower floor of a lofty tower, or at the bottom of a deep pit. The shot thus formed are of various sizes, and a small proportion are imperfect as regards sphericity. Having been perfectly dried by artificial heat, the shot are sorted according to their sizes by means of a series of sieves, the meshes of which have different degrees of fineness; and the imperfect shot are separated from the perfect by allowing the whole to roll down an inclined plane. The spherical shot are propelled into a receptacle more distant from the inclined plane than those of imperfect form are able to reach. The shot thus sorted are then polished by rolling about half a ton together in an iron barrel which that quantity nearly fills.

England imports a little lead from foreign countries, but exports much more of her own lead. The value of the lead and lead-manufactures exported in 1847 was 179,344*l*. The principal markets for English lead are Russia, France, Holland, India, Brazil, and British North America. The foreign lead imported is almost wholly supplied by Spain, the produce of exceedingly rich mines situated at Adra in Granada. The quantity furnished by these mines has fluctuated greatly,—a circumstance, in all probability, owing to the unsettled state of the country. The greater or less produce of these Spanish mines has a great influence upon the price of lead in every market of the world.

Lead-mines have been opened and worked in various parts of the United States, especially at Galena, in Illinois.

Action of Lead on the Human System.—In a purely metallic state, lead produces no action on the human system except such as arises from its mechanical properties; but, as soon as it becomes oxidised, it can combine with the contents of the stomach, and produce different effects, according to the nature of the substances it meets with. 'In whatever form lead is habitually applied to the body, it is apt to bring on the train of peculiar symptoms: the inhalation of its fumes, the habitual contact of any of its compounds with the skin, the prolonged use of them internally as medicines, or externally as ointments and lotions, and the accidental introduction of them for a length of time with the food, may, sooner or later, equally induce *Colica Pictonum*, or Painter's Colic. Of all exposures none is more rapid or certain than breathing the vapours or dust of the preparations of lead.' (Christison.) The action of lead on the human frame differs greatly according to the kind of preparation of lead, the quantity employed, the length of time or frequency of exposure to it, and the channel of its introduction into the body. 'One class of symptoms indicates inflammation of the alimentary canal; another, spasm of its muscles; and a third, injury of the nervous system, sometimes apoplexy, more commonly palsy, and that almost always partial and incomplete. Each of these classes of symptoms may exist independently of the other two; but the last two are more commonly combined.' (Christison.) Fatal cases from poisoning by large quantities of the salts of lead are not numerous, as there is in general time to administer antidotes; but death from the slow and insidious introduction of lead into the system is of frequent occurrence. The principal source of these is the use of water or other fluids containing lead in solution, the intermixture of lead, as adulterations or accidentally, with articles of food, or handling preparations of lead in the daily business of artisans, such as painters, plumbers, &c.

The lid or cover of cisterns should never be made of lead, as the vapour which condenses on it possesses all the solvent power of distilled water. It is also unsafe to use water which has flowed over leaden roofs, more particularly in towns, as the surface of the lead is almost invariably coated with some soluble salt.

No kind of adulteration or impregnation with lead, from accident or ignorance, is more common than that of wine or cyder. Even a single shot of lead left by accident in a bottle after cleaning has produced severe colic; and the more extensive use of the salts of lead to *fine* wines, as it is termed, that is, to remove their acid taste and make them sweet, has occasioned most serious consequences.

In small medicinal doses acetate of lead acts as a sedative and astringent. It manifests its sedative effect even when applied externally, and lessens discharges from ulcers, though its application to these is not always safe. Even white lead (carbonate of lead) ointment applied to ulcers has proved fatal.

LEAD, BLACK. [Plumbago.]

LEAF, an expanded part of a plant attached to the axis, and from whose axils leaf-buds are developed. It is usually thin, and traversed with one or more veins composed of woody and vascular tissue; sometimes it is fleshy, and occasionally cylindrical, or nearly so. The veins are held together by a green or coloured parenchyma, which is inclosed in an epidermis pierced by stomates or openings. A leaf is either united to the stem by means of a petiole or stalk, or it is sessile, that is to say, seated on the branch without an

intermediate stalk. Through the petiole pass the veins before they can expand into the broad or green part forming the blade of the leaf.

The petiole is usually articulated with the stem, rarely with the blade of the leaf; the latter however sometimes happens, as in the orange. It usually loses itself in the parenchyma of the blade, but sometimes passes beyond it, and in compound leaves often forms a tendril or spine. Sometimes, as in the orange and in the Nepenthes, and some other plants, it assumes the appearance of the leaf itself.

When leaves have but one blade, they are simple, as in the apple; but when there is more than one blade, each seated on a ramification of the petiole, a leaf is called compound.

The substance of the leaf consists of parenchyma connecting the vascular tissue. It differs greatly in different plants, and appears to be so arranged as to meet the wants of the species in which it is found. Usually the cells of parenchyma belonging to the upper surface are planted perpendicularly upon the epidermis, while those of the under surface are parallel with it; but this varies very much, and it often happens that the arrangement of the parenchyma is alike on both sides of the leaf. All that appears uniform with respect to this substance is, that it contains grains of chlorophyl in abundance, that it is traversed by air cavities in all directions, and that the latter are universally in communication with the stomates. The usual cause of the under side of leaves being paler than the upper is that the parenchyma is more cavernous on that side than the other.

In their position leaves are usually either alternate or opposite, in pairs upon the stems; in some however there are more than two leaves placed on the same plane, which are called verticillate.

The function of leaves is to afford an expanded surface for the evaporation of the fluids of the plant by which means new sap is constantly introduced into the plant. At one time they were supposed to be organs of respiration, digestion, &c., but these views have been exploded since it has been discovered that each individual cell of a plant is self-existent, and produces its own peculiar secretions.

LEAF-BUD is an important organ of plants. It consists of leaves in a rudimentary state, resembling scales, arranged one over the other, and usually in a spiral manner, around a cellular conical centre, which has the power of growing upon the application of certain stimuli, namely, light and moisture combined with a variable degree of temperature. It is regarded by physiologists as a miniature plant, having an analogy with the embryo, and, although in its natural condition only forming part of a complicated system of organisation in connection with other leaf-buds, yet having an independent power of growth, which it is capable of exercising, if separated from the branch or system to which it belongs. This fact is obvious in the common gardening operation of propagation, for which purpose the buds of plants are cut off and made to form new individuals, as in the process called *budding*, in striking from *eyes* (*i. e.* leaf-buds), grafting, layering, propagation by cuttings, and the like. None of these operations can succeed except through the independent vitality of the leaf-bud. The leaf-bud is always produced in the axil of a leaf. The manner in which the scales of a bud are packed varies very much; and, according to the appearance they present when cut through, they have a variety of names, such as duplicate, imbricate, &c.

LEAGUE (*Leuca, Leuga, Leuva, Leweke*, &c.), an itinerary measure, which in modern English means the 20th part of a degree of latitude, or three geographical miles, each of which is the 60th part of a degree. The league of our sailors may be described and easily remembered as 3.456 statute miles of 1760 yards each. The same marine league is used by the French and other nations: besides which, the French have among their itinerary land measures two distinct leagues (or *lieues;* in some of the provinces *lègues*), the first of 2000 toises, or 2.42 English miles, which is the legal posting measure; the second of 25 to the degree, or 2.77 English miles.

The *Leuca* of the ancient English law-writers is necessary to be determined before the rights given by many charters can be defined; but unfortunately the length of this measure is enveloped in utter confusion. The modern lawyers, we believe, evade the question by setting it down as a mile: thus the legal minimum distance between two markets, which was certainly seven leucæ, is now called seven miles.

By citations in Ducange, Paucton, &c., it appears that Hesychius distinctly describes the λεύγη, and Jerome, Jornandes, &c., the *leuca* (stated by Camden to be derived from the Celtic *leach*, a stone) as a Gaulish measure; and the original Gallic league was set down by the Romans as a mile and a half of their own measure, which was in all probability a rough estimation, first used in the 'Itinerary' of Antoninus. In that work the distances from place to place in Gaul are frequently given in leagues (always in whole numbers), which are in every instance reduced to Roman miles at the rate of a mile and a half to each league. Hence, taking the Roman foot at 11.62 English inches (which is a mean between the most trustworthy measures) and the pace of five feet at 58.1 inches, the Roman mile of 1000 paces is 1614 English yards, and the leuca was therefore 2421 yards, subject to the error of the Roman estimation; or 1.376 modern English miles, with the same reservation.

This leuca in all probability was brought by the Normans into England. It is true that the Saxon charters of Ingulphus describe distances in leucæ; but the genuineness of these charters is now considered more than questionable, and perhaps this very circumstance is a presumption against them. But the leuca soon began to vary in length. Ducange cites an old metrologist who speaks of two leucæ, the one legal of 3000 paces, the other common, and varying much in different countries.

The earlier statutes do not define the itinerary measures, confining themselves entirely to those by which land and goods were bought and sold. And the itinerary measures seem to have been on

the increase, perhaps for the following reason:—The jurisdiction of towns, monasteries, &c., was usually defined as extending a leuca or a given number of leucæ in every direction from their precincts, so that it became the interest of these powerful bodies to make the leuca as long as possible. The old French term *ban-lieue*, *banni-leuca*, refers to the space over which jurisdiction was granted.

There is sufficient evidence to show, that whatever the mile of a later date may have been, the leuca was generally two miles, though instances occur in which it is still described as 1500 paces.

Bracton (Henry III.) and Fleta (Edward I.?) both assert 6 leagues and half a league and the third part of a half (or $6\frac{2}{3}$ leagues) as being the distance between two markets which do not injure each other: because 20 miles is a reasonable day's journey: now (both of them say) if the *dieta*, or day's work, be divided into three parts, the first is for going to the market, the second for business, and the third for returning. This appears to mean that no market should be established within a third of a day's journey of any one who is already within a third of a day's journey of the established market, so as to give him the option of going to either: that is, the two markets must be at least $\frac{2}{3}$ of 20 miles apart, which being further described as $6\frac{2}{3}$ leagues, shows that the leuca is two miles. This quotation is important, as establishing the meaning which the old law-writers attached to the word.

It may then, we think, be confidently asserted, that the league, which began as a mile and a half (Roman), soon became lengthened, until it remained fixed at two of the miles of the day. It appears also that this length of two miles was a settled league at so early a period that it is the measure of our oldest law-writers, and of most of the oldest charters. It depends therefore upon the mile of the 13th and 14th centuries.

LEAKE, ADMIRAL, SIR JOHN, born at Rotherhithe in 1656, was bred to the sea, and from 1677, when he fought in Sir E. Spragge's action with Van Tromp, to the end of the century, served with high credit in various stations; more especially he distinguished himself in the battle of La Hogue. He was in command on the Spanish coast during the War of the Succession. In 1707 Sir John Leake was made commander-in-chief of the fleet, and in 1709 Rear-Admiral of Great Britain. In the same year he became a Lord of the Admiralty. He died August 1, 1720.

LEAMINGTON. [Warwickshire.]

LEAP YEAR, the name given to every fourth year of the Julian calendar, in which one additional day (a twenty-ninth day of February) is reckoned. This correction constitutes the distinction of the Julian calendar: the necessity for the Gregorian correction arises from the years being made a very little too long, one with another, by making them consist of $365\frac{1}{4}$ days each, as is done when a day is added to each fourth year. The Gregorian correction is made by omitting three leap-years in four centuries, and it is settled that the common years, which would otherwise be leap-years, shall be those which terminate centuries in which the first pair of figures is not divisible by four. Thus the years 1800 and 1900 are not leap-years, but 2000 is leap-year: 2100, 2200, 2300 are not leap-years, but 2400 is leap-year.

LEASE. A lease, or letting, is sometimes called a Demise (demissio). He who lets land, whether it be for agricultural purposes, or merely a piece of land with a dwelling-house on it, is called the Lessor, and he to whom land is let is called the Lessee. A lease is not properly a conveyance, though it is sometimes called so; it is merely an interest in land for a certain time, and on certain terms. The fact of a lease for years being called an Estate does not alter the nature of the thing. The reservation of a rent is not essential in a lease; but payment of rent is now the chief condition on which lands are let.

To constitute a lease, it is necessary that the lands must be let for a less time than the period for which the lessor has an interest in the lands. If a man parts with all his interest in the lands or tenements, the conveyance is an assignment, and not a lease. The relation that is created by a lease between the lessor and lessee is usually expressed by the phrase landlord and tenant. The lessor has a reversion in the lands which are demised, that is, after the expiration of the lease the land reverts to him. The lessor, by virtue of this reversion, seignory, or lord's title, has the power of distraining on the land for the rent which is agreed on, and for the services which may be due by the terms of the lease; and fealty is always due to the lessor. [Fealty.] The ordinary lease is that for a term of years, by which lease a rent, generally payable in money, at stated times, is reserved to the lessor. These stated times are usually quarterly periods.

The words used in a lease for the purpose of conveying that interest in the lands which constitutes a term of years are, 'demise, grant, and to farm let.' These words are derived from the law-Latin expressions 'demisi, concessi, et ad firmam tradidi.' The word 'firma,' farm, is said to signify originally 'provisions,' and 'to farm let' does not properly signify to let to be farmed, in the modern sense of the term, but to let on the condition of a certain rent being paid in farm, that is, in provisions.

The interest which a man acquires in land by a lease for years is a term of years, or an estate for years. The word lease is used in common language also to signify the estate or interest which the lessee acquires by the lease; but the word lease signifies properly the contract by which the lessee acquires the interest in the lands.

The words 'demise,' &c., above mentioned, are the proper words to constitute a lease for years: but any words are sufficient which clearly show 'the intent of the parties that the one shall divest himself of the possession (of the land), and the other come into it for a determinate time.' When the written contract is not intended to be a lease, but an agreement for a future lease, it is often difficult to determine whether the contract is not so expressed as to make it a lease.

At common law, it was necessary for the lessor to enter on the lands in order to make the lease

complete, and no writing was necessary. But the Statute of Frauds (29 Ch. II. c. 3, § 1) enacted, that all leases, estates, interests, of freehold or terms of years, created by livery and seisin only, or by parol, and not put in writing and signed by the parties so making the same, or their agents thereunto, lawfully authorised by writing, shall have the force and effect of leases or estates at will only, except leases not exceeding the term of three years from the making thereof, upon which the rent reserved to the landlord during such term shall amount to two-thirds at the least of the full and improved value of the thing demised. A deed is not necessary to constitute the writing a lease, unless the tenement is an incorporeal hereditament or a reversion or remainder. But leases are generally made by deed, because covenants can be made only by deed.

The word 'lands,' which refer to the subject-matter of a lease, comprehends what is upon the lands, as houses and other buildings, though houses and buildings are generally mentioned specifically in the lease.

The law of leases comprehends a great number of rules, which may be conveniently reduced to the following general heads:

1. The things which may be subjects of leases.
2. The persons who may grant leases, and their powers to grant.
3. The form of leases, and the legal construction of the agreements contained in them.

The examination of these subjects belongs to treatises on Law. The article 'Leases and Terms of Years' in Bacon's 'Abridgment' is generally referred to as a good compendium of the law. A lease may contain any agreements that are lawful. The agreements or covenants in farming-leases ought to be such that the lease may be most beneficial to the landlord and the tenant, and by consequence to the public generally; but this is not generally the case in England at present.

The chief subjects of leases are dwelling-houses and buildings of all kinds, cultivable lands, and mines. Many persons who have not the complete ownership of houses and lands are enabled to grant leases under particular powers; and there are many statutes under which particular classes of persons are enabled or restrained as to the granting of leases, such as Bishops, Deans and Chapters, and others.

In 1845 an act was passed (8 & 9 Vict. c. 124) entitled, 'An Act to facilitate the granting of certain Leases.' Its object is to substitute abbreviated forms for those previously in use.

Leases in general require either an ad valorem stamp or the common deed-stamp, without which the instrument cannot be given in evidence. Leases for a term determinable on a life or lives not exceeding three, and the leases of all ecclesiastical corporations, whether aggregate or sole, for any term not exceeding twenty-one years, are exempted from the duty. There is also a stamp-duty on agreements for leases.

LEAST SQUARES, METHOD OF. This is a method which, since its first introduction, has been shown to be the method of finding the most probable truth, when a number of discordant observations have been made upon a phenomenon. The earliest attempt at anything of the sort was made by Cotes, in a tract entitled 'Estimatio Errorum in Mixta Mathesi,' in which he very distinctly recommends a process which is identical with that of the Method of Least Squares. It is remarkable that Cotes proposes his theorem not merely as a mode of finding a convenient mean (as was done by Legendre and Gauss), but as giving positively the most probable result. He even introduces the hypothesis of observations having different weights (though not with perfect correctness), and comes as near as possible to the assertion afterwards proved by Laplace.

Legendre, in his work on Comets (1806), first distinctly proposed the application of the method to any case, and Gauss afterwards stated that he had been in the habit of using it since 1795. Finally, Laplace, in his 'Theory of Probabilities' (1814), and we believe in a previous paper published in the 'Memoirs of the Academy of Sciences,' showed that this method was in all cases the one which the principles of that theory pointed out as giving the result, which, from the observations, has the greatest weight of probability in its favour. It is impossible to give any account of this method in a form brief enough for the present work.

LEATHER. This substance, which is universally employed throughout the civilised world, is prepared from the skins of animals, or, it would perhaps be more correct to say, consists of that substance after it has been chemically changed by the process of tanning. This change is effected by means of a substance residing in several vegetable matters, to which the name of *tannin* has been given. When this tannin, which is soluble in water, is applied to the hides of animals from which the hair, epidermis, and any fleshy or fatty parts adhering to them are removed, and which hides then consist wholly of *gelatin*, also soluble in water, these two soluble substances so unite chemically as to form the wholly insoluble substance called leather. [TANNING.] Of the ox-hides which are converted into leather, those supplied by bulls are thicker, stronger, and coarser in the grain than those of cows; while the hides of bullocks are intermediate between those of the bull and the cow. Such leather is employed for the soles of boots and shoes; for most parts of harness and sadlery; for making leather trunks, buckets, hose for fire-engines, and pump-valves; for the thick belts used in military accoutrements; and for the gloves of cavalry. The thick *buff-leather* formerly used as armour, and which was pistol-proof, and would resist the edge of a sword, was made from the hide of the urus, or wild bull. The skins of *calves*, though thinner than those of cows, are thicker than most other kinds of skin which are converted into leather. They are *tawed* [TANNING] for the use of bookbinders, and are tanned and curried for the upper leathers of boots and shoes. *Sheep-skins*, when simply tanned, are employed for inferior bookbinding, for leathering bellows, and for various other purposes for which a cheap leather is required. All the *white-leather*, as it is termed, which is used for whip-

lashes, bags, aprons, &c., is of sheep-skin; as are also the cheaper kinds of *wash-leather*, of which gloves, under-waistcoats, and other articles of dress, are made. Mock or imitation morocco, and most of the other coloured and dyed leathers used for women's and children's shoes, carriage-linings, and the covering of stools, chairs, sofas, writing-tables, &c., are also made of sheepskin. *Lamb-skins* are mostly dressed white or coloured for gloves; and those of *goats* and *kids* supply the best qualities of light leather, the former being the material of the best morocco, while kid leather affords the finest material for gloves and ladies' shoes. Leather from goat-skins, ornamented and sometimes gilt, was formerly used as a hanging or covering for walls. *Deer* and *antelope* skins, shamoyed or dressed in oil [TANNING], are used chiefly for riding breeches. *Horse-hides*, which, considering their size, are thin, are tanned and curried, and are used by the harness-maker, especially for collars; and occasionally, when pared thin, for the upper leathers of ladies' walking shoes. *Dog-skins* are thick and tough, and make excellent leather. *Seal-skins* produce a leather similar but inferior to that supplied by dog-skins; and *hog-skins* afford a thin but dense leather, which is used mostly for covering the seats of saddles.

Currying is the general name given to the various operations of dressing leather after the tanning is completed, by which the requisite smoothness, lustre, colour, and suppleness are imparted. The processes of the currier are various. The first is styled *dipping* the leather. It consists in moistening with water, and beating upon a trellis-work of wooden spars, with a mallet or mace. After this beating, by which the stiffness of the hide or skin is destroyed, it is laid over an inclined board, and scraped and cleaned, and, wherever it is too thick, pared or shaved down on the flesh side, by the careful application of various two-handled knives; and then thrown again into water, and well scoured by rubbing the grain or hair side with pumice-stone, or with a piece of slaty grit, by which means the *bloom*, a whitish matter which is found upon the surface in tanning, is removed. The leather is then rubbed with the *pommel*, a rectangular piece of hard wood, about twelve inches long and five broad, grooved on the under surface, and fastened to the hand. The currier uses several of these instruments, with grooves of various degrees of fineness, and also, for some purposes, pommels of cork which are not grooved at all. The object of this rubbing is to give grain and pliancy to the leather. The leather is then scraped with tools applied nearly perpendicular to its surface, and worked forcibly with both hands, to reduce such parts as may yet be left too thick to a uniform substance. After this, it is dressed with the *round knife*, a singular instrument which pares off the coarser fleshy parts of the skin. In addition to these operations, the currier uses occasionally polishers of smooth wood or glass for rubbing the surface of the leather; and, when the leather is intended for the use of the shoemaker, he applies to it some kind of greasy composition called *dubbing* or *stuffing*.

Leather is occasionally dressed 'black on the grain,' or having the hair or grain side instead of the flesh side coloured. The currying operations in such a case are similar to those above described, but the finishing processes are somewhat modified. The leather is rubbed with a gritstone, to remove any wrinkles and smooth down the coarse grain. The grain is finally raised by repeatedly rubbing over the surface, in different directions, with the pommel or graining board.

Japanned leather of various kinds is used in coach-making, harness-making, and for various other purposes. 'Patent leather' is covered with a coat of elastic japan, which gives a surface like polished glass, impermeable to water; and hides prepared in a more perfectly elastic mode of japanning, which will permit folding without cracking the surface, are called 'enamelled leather.' Such leather has the japan annealed, something in the same mode as glass: the hides are laid between blankets, and subjected to the heat of an oven at a particular temperature during several hours.

In making *Russia leather*, the skins are freed from the hair or fleece by steeping them in an ash-lye, then rinced, fulled, fermented, and cleaned. They are then soaked for forty-eight hours in a bath composed of water mixed with a paste of rye-flour. The skins, when taken out of the bath, are left in tubs for fifteen days, then washed, and immersed in a boiler containing a hot decoction of willow bark, in which they are handled and pressed for half an hour. This manipulation is repeated twice a day for a week, after which the tanning infusion is renewed, and the process is repeated on the same skins for another week, after which they are exposed to the air to dry, and are then dyed, and curried.

Shagreen, a peculiar kind of leather, or rather of prepared skin, formerly much used for the covers of watch-cases, mathematical-instrument cases, &c., is produced by soaking, scraping, rubbing, softening, salting, and dyeing. The unevenness of surface is produced in a singular way. The grain side of the skin is strewed with the hard round seeds of the Goose-Foot (*Chenopodium album*). A felt being laid over these, they are trodden deeply into the soft yielding skin; and when dried, the seeds may be shaken out without violence, leaving the skin in a hard horny state, covered with deep indentations.

Leather-splitting machines, by which even very thin skins may be divided into two thicknesses, each of which is capable of being dressed as a perfect skin, have called forth much ingenuity of contrivance. In one machine of this kind, the skin is drawn between two revolving rollers, and presented, as it emerges from their grasp, to the edge of a long and very sharp knife, which is kept continually moving a little backwards and forwards with great velocity.

It is supposed that there are at least 250,000 persons employed in the various branches of leather manufacture in this country; including tanners, curriers, leather-dressers, shoe-makers, glove-makers, sadlers, harness-makers, &c. The average production of leather in the United Kingdom about twenty years ago was 60,000,000 lbs. annually; but, since the repeal of the Excise duty,

no means exist for determining the quantity made. The quantity of foreign leather, tanned or tawed, imported during 1848, was 1,220,000 lbs. The value of British leather and leather manufactures, exported in 1848, was 269,241*l.*

Gutta percha is now used for some of the purposes wherein leather used to be employed.

LEAVEN. [BREAD.]

LEBANON. [SYRIA.]

LEBLANC. [INDRE.]

LEBRUN (or LE BRUN), CHARLES, an eminent French painter, was born at Paris in 1619. His father was an indifferent sculptor. His merit obtained him the favour of Louis XIV., who appointed him his principal painter, president of the Academy of Painting and Sculpture, and director of the Gobelin manufactory, conferred on him the order of St. Michael, and frequently visited his studio while he was engaged on the battles of Alexander, the best known and most admired of all his works. Lebrun died at Paris in 1690.

LECCE, a town in the Neapolitan province of Terra-di-Otranto, is situated 210 miles E. from Naples, and 9 from the coast of the Adriatic. It is a bishop's see, and one of the best built towns in the kingdom of the Two Sicilies, with wide streets, a handsome market-place, several fine churches, a royal college, and 15,000 inhabitants. Considerable trade is carried on here in the agricultural products of the country, the principal of which are oil, tobacco, wool, cotton, and gum. There are also manufactories of lace.

LECHLADE. [GLOUCESTERSHIRE.]

LECTOURE. [GERS.]

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LECYTHIDA'CEÆ, an important but small natural order of plants with singular fruits, and very large fleshy flowers, inhabiting the woods of South America. They are regarded by De Candolle as a section of *Myrtaceæ*. *Lecythis ollaria*, a tree growing in the forests of Cumana and Brazil, with a hardy woody fruit a large as a child's head, and opening by a lid like that of a jar or urn. It contains numerous large seeds. *L. Zapucajo*, a large Guiana tree, with large handsome-shaped fruit, containing numerous seeds as large as almonds, and quite as agreeable when fresh. They are sometimes seen in the fruiterers' shops in London.

LEDBURY. [HEREFORDSHIRE.]

LEDUM, a genus of plants belonging to the natural order *Ericaceæ*. *L. latifolium* is a small evergreen shrub, with an irregularly branched stem. It is a native of the swamps around Hudson's Bay, Labrador, Greenland, and various parts of the United States. This and the other species of Ledum have been used as stomachics.

LEDOUX, CLAUDE NICOLAS, born at Dormans, in the department of the Marne, in 1736, was appointed in 1771 architect to Madame Du Barri, for whom he erected the elegant pavilion De Louveciennes, and the Château de St. Vrin, near Arpajon. He built several hotels in Paris; but the 'Barrières' are his principal work remaining in that city. He died Nov. 19, 1806, at the age of seventy.

LEDYARD, JOHN, was born in Connecticut, in the United States, and educated at Dartmouth College, New Hampshire. He afterwards worked his passage from New York to London in 1771 as a common sailor, and in 1776 sailed with Capt. Cook, in quality of corporal of marines. While thus engaged, he conceived the bold scheme of traversing the unknown regions of America, from the neighbourhood of Nootka Sound to the eastern coast; and so earnest was he, that, being frustrated in his design of reaching the western shore of America by sea, he set out from England towards the end of 1786, with ten guineas in his pocket, hoping to reach Kamtchatka, and thence effect a passage to America. He traversed Denmark and Sweden, passed round the head of the Gulf of Bothnia, after an unsuccessful attempt to cross it on the ice, and reached St. Petersburg in March 1787, without money, shoes, or stockings, having gone this immense distance on foot in an Arctic winter. At St. Petersburg he obtained money to the amount of twenty guineas, and permission to accompany a convoy of stores to Siberia. But for some reason he was arrested there in January 1788, by order of the empress, and conveyed to the frontier of Poland. He found his way back to England, after suffering great hardship. Almost without resting, he eagerly closed with the proposal of the Association for Promoting the Discovery of the Inland Parts of Africa, to undertake a journey into Africa. He left London, June 30, 1788, and, travelling by Marseille and Alexandria, reached Cairo, Aug. 19, where he died soon afterwards of a bilious disorder.

LEE, River. [CORK.]

LEE, NATHANIEL, was born in the latter part of the 17th century. He was educated at Westminster, and at Trinity College, Cambridge. He wrote 13 tragedies, of which two, 'Alexander the Great,' and 'Theodosius,' remained favourites for a long time. A derangement of mind led to Lee's temporary confinement in Bedlam. He died in 1691 or 1692, at the age of about 34.

LEECHES (Zoology), *Hirudinidæ*, a family of annulose or red-blooded worms, placed by Cuvier in the third order of the *Annelida*, and in the second family of the *Abranches sans Soies*. The classification of MM. Audouin and Milne Edwards does not differ materially from that of Cuvier.

The ancients appear to have only known the most common species of leech. Aristotle makes no mention of them, and they do not appear to have been used in medicine in the time of Hippocrates. Pliny describes them very clearly under the names of *Hirudines* and *Sanguisugæ*, and the Sea-Leech is distinctly mentioned by Belon, Rondelet, and all the writers on natural history since the revival of letters.

The true Leeches are all destitute of branchiæ, but there exists a series of small membranous sacs, each of which communicates externally by a minute orifice situated on the ventral aspect of the body. Hence water penetrates into the sacs, and is brought into contact with a mesh of fine vessels ramifying upon them. But, though the true leeches are destitute of branchiæ, a sort of

worm, usually classed with them from its similarity, is furnished with branchiæ. It is a parasite on the Torpedo, in the Mediterranean and other seas. It is the *Branchellion* of Savigny; *Brancheobdella* of De Blainville; and *Polydora* of Oken.

The true leeches are divided into three sections.

In section 1 the anterior sucker is separated from the body by a distinct strangulation or neck. Genera:—1, *Albione* (Sav.), *Pontobdella* (Leach); 2, *Hæmocharis* (Sav.), *Ichthyobdella* (Blain.).

In section 2 the anterior sucker is very slightly separated from the body. Genera:—1, *Geobdella* (Blain.), *Trochetia* (Dutrochet); 2, *Pseudobdella* (Blain.); 3, *Hæmopis* (Sav.), *Hypobdella* (Blain.) (the Horse-leech is an example of this genus); 4, *Sanguisuga* (Sav.), *Jatrobdella* (Blain.) (this genus contains the true medicinal Leeches, of which there are several species); 5, *Bdella* (Sav.), from the Nile; 6, *Nephelis* (Sav.), *Erpobdella* (Blain.).

In section 3 the anterior sucker is wanting. Genera:—1, *Clepsina* (Sav.), *Glossopora* (Johnson), *Glossobdella* (Blain.). The two first genera named are parasitic, and attach themselves to fishes. Of many species earth-worms are the favourite prey.

LEECHES, *medical use of*. Of the species described in the preceding article it is intended to treat here only of those of the genus *Sanguisuga* (Savigny), as they only can be employed for medical purposes. The *S. medicinalis* is now rare in England, owing to the draining of so many of the ponds and bogs in which it formerly abounded. England derives the very large number required mostly from Sweden, Poland, and Hungary.

The *S. officinalis* has a green body or light blackish green, the back marked with six longitudinal bands of an iron colour, spotted with black spots at their middle portion and edge. The belly is of a yellowish green *without spots*, but broadly bordered with black. The segments of the body are very smooth. It is large, often seven inches long. It lives in pools and rivers. There are three varieties.

S. medicinalis has the body of a deep green, its back marked with six longitudinal bands of an iron colour, pretty clear, spotted with black points, generally triangular. The belly is greenish *spotted*, and broadly bordered with black, and the segments of the body rough from granular eminences. It inhabits ponds and small lakes.

Leeches are oviparous. The ova remain in the uterus for some time, where they become invested first with a serous membrane, and then with a glutinous fluid, which remains attached to them after their expulsion, and serves as a protecting covering after they are deposited in the clay and holes of the sides of the ponds. The leeches generally deposit the *cocoons* from May to the end of September.

About five years are required before the leech attains a state of maturity; while very young, they are quite unfit for medical purposes. They are caught in various ways, by the hand, or by a person wading in the shallow waters during the spring of the year, when they adhere to his naked legs; but in summer, as they have retired to deeper waters, a raft is constructed of twigs and rushes, by which a few are entangled. Baits are deposited, generally pieces of decayed animal matter or liver, to which the leeches resort, and are then caught; but this last method is thought to injure the health of the animal. Many sicken and die on the journey, especially during warm weather. They are conveyed either in bags or small barrels with a canvas cover.

A leech may be known to be in good health if it be active in the water and plump when taken out. Leeches vary in the quantity of blood they can abstract, from one drachm to half an ounce: from one to two drachms is the average. The quantity is often doubled by the expedients resorted to after the leech has been removed, either dry or wet cloths being applied, or in many cases cupping glasses; but cataplasms of linseed meal are most beneficial where they can be applied.

One gray or German leech is deemed equivalent to two green or Hungarian leeches. In applying leeches it should be borne in mind that certain states of the patient hinder or indispose them to bite. Where the skin is very thick, they cannot puncture it, or, if the person has been using sulphur, the exhalation of the sulphuretted hydrogen is disagreeable to them; even the fumes of tobacco, vinegar, &c., will prevent them biting; also, if grease, salt, or vinegar, be on the spot to which they are applied, they refuse to attach themselves to it. The existence of hairs on the spot seems to hinder them from biting, and also from forming a vacuum to suck up the fluid, on which account they should be carefully shaved off. The leeches should be taken out of the water, and allowed to creep for some time over a dry warm cloth: various applications are recommended to induce the leech to bite on a particular spot such as milk, porter, &c.

When the leech has dropped off, it should be seized by the tail or caudal end, and striped between the finger and thumb, so as to cause it to disgorge most of the blood. It is proper to allow it to retain a third of the blood. This is preferable to applying salt or vinegar to the mouth. It should then be placed in many successive fresh waters, and it may perhaps survive, and after many months be again fit for use.

Should there be any difficulty in stopping the flow of blood when the leech is removed, a weak solution of creasote applied to the part will generally effect it, or felt scraped from a hat, or gum in powder, or flour, or the dust of the puff-ball, or the application of a compress and bandage, tying a ligature, or touching the wounds with lunar caustic. The patient should at the same time drink a saturated solution of alum, or take dilute sulphuric acid.

The increasing scarcity of leeches renders their preservation and propagation objects of primary importance. The death of a vast number of leeches is occasioned by errors in the method of keeping them. Though aquatic animals, it is not enough that they be supplied with water. They breathe by their entire surface, and are accustomed to change their skin every four or five days.

Their body is covered, like that of all animals and plants which inhabit the water, by a slimy or mucilaginous fluid. When present in a limited degree, this mucous secretion is highly serviceable to them; in excess it is destructive. It is impossible for them to diminish it when it has accumulated, or to denude themselves entirely of their old skin, in water only. They must have some resisting body to creep over or through in order to accomplish this object, such as charcoal, sand, or pebbles, moss, &c. The great extent to which the trade in leeches is carried on renders attention to this subject of paramount importance.

LEEDS, a municipal borough and parliamentary borough, is the principal emporium of the woollen manufactures in the West Riding of Yorkshire. The municipal borough is divided into 12 wards, and is governed by 16 aldermen and 48 councillors: the population in 1841 was 152,054. The parliamentary borough returns 2 members to the House of Commons, and had in 1841 a population of 151,063.

Leeds is situated on the slope and partly on the summit of a hill which rises from the north bank of the Aire, and from the top declines to the east, west, and north. The northern and southern parts are connected by six bridges; of which one occupies the site of a very ancient bridge, and two others are suspension bridges on the peculiar bow-and-string principle—first introduced by Mr. Leather, of Leeds. Leeds is admirably situated for trade, being placed in the heart of the inland navigation of the county. It communicates with the eastern seas by means of the Aire and Calder Navigation to the Humber, and westward by the Leeds and Liverpool Canal with the Mersey. It is, or rather will shortly be, the centre of a system of railways, radiating in seven different directions from the town; and at the present time (April 1849) a magnificent joint central station is being constructed.

The principal manufacture of Leeds is woollen cloth. Though the spinning of worsted and the manufacture of worsted stuffs is not extensively followed at Leeds, vast quantities of these goods are brought there to be dyed and finished. The dye-houses and dressing-shops at Leeds are very extensive. In these establishments both the woollen and worsted goods are finished after being purchased in the rough, at the cloth-halls and piece-halls of the clothing towns. The mills at Leeds for the spinning of flax for canvas, linen, sacking, thread, &c., are very extensive; there are also large manufactories of glass, earthenware, steam-engines, locomotives, and all kinds of machinery. These and the other operations of the district are facilitated by the abundant supply of coal, produced from the mines in the vicinity of the town.

The largest commercial buildings in Leeds are the cloth-halls. The Coloured-Cloth Hall was built in 1758; the White-Cloth Hall in 1775. In the cloth-halls, the principal sales of woollen cloths in their rough state from the country manufacturers to the merchants are effected. The cloth markets are held on Tuesdays and Saturdays, and last only one hour and a quarter at each hall.

The Commercial Buildings may be considered as an Exchange for the merchants. The form is a parallelogram, with the south-western corner rounded. This portion is formed into a spacious portico, which has considerable architectural beauty. The entire edifice is of stone. The Free Market occupies an area of 9758 square yards. The Central Market is a spacious covered building, and is one of the principal ornaments of the town. It has a handsome elevation in the Grecian style. The South Market is chiefly used for the leather fairs, of which eight are held annually. The Corn Exchange has a façade in which are two Ionic columns in antis, which support an entablature and pediment, and a small bell turret is raised above the whole. The banks of Leeds are numerous. The Court House is a building of no pretensions. A new gaol was opened in 1847, which cost 43,000*l.*: it is one of the largest and most capacious of the buildings in the town. The Cavalry Barracks are just within the northern boundary of the township: the buildings and the parade ground occupy more than eleven acres of land. The workhouse is a large and well-conducted establishment. Water-works have existed in the town since 1694. A new supply of water will shortly (1849) be brought to the town, from springs near the Bramhope tunnel of the Leeds and Thirsk Railway. The town was first lighted with gas in 1828. It contains good public baths, a theatre, assembly-rooms, and music-hall, the latter of which is now used for various public purposes. An elegantly proportioned concert-room and a well-appointed news-room are provided in the Commercial Buildings. A Zoological and Botanical Garden was opened at Leeds in 1840; but it has not met with adequate support, and has been recently (1849) converted into private pleasure-grounds.

The Leeds Infirmary was established in 1767; it occupies a large area near the Coloured-Cloth Hall, but is about to be taken down to make room for the central railway station, and a new Infirmary is to be built in another spot. The House of Recovery, the Dispensary, the Eye and Ear Infirmary, and the Lying in Hospital are other medical charities of the town.

Large funds are in the hands of the Committee of Pious Uses, derived from various sources, and applied to various purposes of education, charity, and the improvement of the town.

The parish church of St. Peter was rebuilt in 1840. It is in the decorated style; the nave and chancel together are 160 feet in length, 28 in width, and 47 high; the side aisles are a little lower than the nave, and 16 feet high. A transept crosses between the nave and the chancel, having a tower at its north end.

Down to 1844 Leeds was comprised within one very large parish; but an act of parliament was obtained in that year for the division of the parish into several smaller parishes. The chief churches besides St. Peter's are St. John's, St. Paul's, St. Mark's, St. Mary's, St. James's, St. George's, Christchurch, and Trinity Church. There are also numerous episcopal places of worship in the out-townships. The Catholic chapel is a fine build-

ing. The dissenting chapels are very numerous: the most conspicuous among them are two Wesleyan chapels, and an elegant Unitarian chapel opened in 1848.

The free grammar-school of Leeds was first endowed in 1552, but it has received many subsequent endowments; it possesses several scholarships and a fellowship. St. John's charity-school, for the education and clothing of 80 girls, was established in 1705; it was originally intended for 40 girls, and included their maintenance. The elementary schools of Leeds are numerous, and comprise National, Lancasterian, Sunday, and Infant Schools. The finest building in or near Leeds, devoted to educational purposes, is the Industrial School at Burmantofts, opened in 1848: the grounds occupy six acres, and the school-house is an elegant Elizabethan structure, 300 feet in length.

The chief institutions at Leeds for supplementary education are the Leeds Philosophical and Literary Society, the Leeds Literary Institution, and the Leeds Mechanics' Institute. The Philosophical Society has an extensive museum, a laboratory, and a library. The Literary Institution has a large reading-room, an extensive library, frequent lectures, and a collection of philosophical apparatus. There is a School of Medicine, a Society for the Encouragement of the Fine Arts, and several public Libraries; of which one, founded by Dr. Priestley in 1768, is one of the most extensive in the North of England.

LEEK. [Allium.]

LEEK. [Staffordshire.]

LEER, or LIER, a well-built market-town, in the Hanoverian province of East Friesland, is situated in 53° 13′ N. lat., 7° 25′ E. long., on the river Leda, which falls into the Ems about three quarters of a mile below the town. It has several churches, a synagogue, an orphan asylum, two hospitals, and 6500 inhabitants, who manufacture linen, woollen, leather, thread, stockings, brandy, beer, soap, &c. Leer has a considerable trade in butter, cheese, and other articles. Ships of 150 tons' burden come up to the town.

LEET is the district subject to the jurisdiction of a court-leet. Sometimes the term is used to denote the court itself, the full style of which is 'Court-Leet and view of Frank-pledge.' The court-leet is also called a law-day, as being the ordinary tribunal.

One of the least improbable derivations of the word 'leet' is that which deduces lath and leet from the Anglo-Saxon 'lathian,' or 'gelathian,' to assemble, both lath and leet indicating a district within which the free male resiants (residents) assembled at stated times for preparation for military defence, and for purposes of police and criminal jurisdiction. Of the first of these objects scarcely any trace exists in the modern leet. The title of the court as a 'view of Frank-pledge' points to its former importance, under the system of police introduced or perfected by King Alfred, which required that all freemen above twelve years of age should be received into a decenna, dizein, decennary, or tithing, sometimes called a visne, or neighbourhood — in Yorkshire and other parts of the north, ten-men-tale (a number, tale, or *tally* of ten men)—and forming a society of not less than ten friborgs, or freeborrows, freemen, each of whom was to be *borhoe*, that is, pledge or security for the good conduct of the others.

Leets are either public or private. The Public Leet is an assembly held in each of the larger divisions of the county, called a hundred, at which all freemen who are resiants within the hundred are bound to attend in person or by their representatives. These representatives were the reeves or chiefs of their respective tithings, whether designated by that or by any of the other appellations, each of whom was accompanied by four good and lawful men of, and elected by, the tithing which deputed them. This public court, which was originally called the folkmote, being held successively in each hundred in the course of a circuit performed by the sheriff, acquired the name of the sheriff's *tourn*; by which name, though itself a court-leet, it is now distinguished from inferior private leets. The private court-leets appear to have been created by grants from the crown, obtained by the owners of extensive domains (which afterwards became manors), and most frequently by religious houses, for the purpose of relieving their tenants and those who resided upon their lands from the obligation of attending the tourn or leet of the hundred, by providing a domestic tribunal, before which the resiants might take the oath of allegiance, and the frank-pledges might be inspected, without the trouble of attending the tourn, and to which, as an apparently necessary consequence, the criminal jurisdiction of the precinct or district was immediately transferred. In these private leets the grantee, called the lord of the leet, performed the duties which, in the public leet or tourn, after the ealdorman or earl had permanently absented himself, fell upon the sheriff. These duties he might perform either personally or by his steward. As a compensation for this, and his trouble in obtaining the franchise, it appears to have been the practice of the great landowner, who by his money and his influence had procured the grant of a private leet, to claim from resiants a certain small annual payment by the name of certum letæ. In many cities and boroughs the ancient authority of the court-leet was in later times superseded by charter of incorporation, in some of which the popular election of magistrates was preserved entire; whilst, in the great majority of cases, the right, though continued in name, was fettered, if not rendered altogether nugatory, by restrictions of various characters and degrees, which are still to be seen in incorporated boroughs not regulated by the Municipal Corporations Act. In other respects, the course prescribed by these charters was adapted to the changes which had taken place in the habits of the people since the institution of the court-leet. Many of the functions of the magistrates in the new incorporations were borrowed from the then comparatively recent institution of Justices of the Peace.

The court-leet is a court of record, which has jurisdiction of such crimes as subject the offenders to punishment at common law. As criminal juris-

diction belongs exclusively to the kingly office, all criminal prosecutions are called pleas of the crown, and the courts in which such pleas are held are the king's courts, although granted to a subject. The authority so exercised under the king's grant is called a lordship, and the grantee is said to be the lord of the leet. It may be claimed either by a modern grant or by prescription, that is, long-established user, from which an ancient grant is presumed.

Private Leets are commonly held, as public leets *must* be, twice in the year: within a month after Easter, and within a month after Michaelmas; and even the former cannot, unless warranted by ancient usage, be held at any other time except by adjournment. The court appears to have been formerly held in the open air. It should be held at its accustomed place, though, if sufficient notice be given, it may be held anywhere within the district. All persons above the age of twelve years and under sixty (except peers and clergymen, who are exempted by statute, and women and aliens), resiant within the precinct for a year and a day, whether masters or servants, owe suit to (*i. e.* personal attendance at) this court, and here they ought to take the oath of allegiance.

It was the province of the court-leet, as well the public leet of the hundred as the private leet, to repress all offences against the public peace, and to enforce the removal of all public nuisances. The leet jury may make by-laws. The leet jury elect their chief magistrates, the reeve or constable, &c. of the private leet, and, as it would seem, the high constable (sometimes called the alderman) of the hundred.

Before the Norman conquest, and probably for some time after, this court of the leet was, if not the sole, at least the ordinary tribunal for the administration of criminal justice in the kingdom.

Offences to be merely inquired of in leets are arson, burglary, escape, larceny, manslaughter, murder, rape, rescue, sacrilege, and treason, and every offence which was felony at common law. These offences being presented by the leet jury as indictors, and the indictment being certified to the justices of gaol delivery, the indictees may be arraigned; but they cannot be arraigned upon the mere production of the court-roll containing the presentments. Formerly all offences inquirable in leets were also punishable there by amercement; but the power of adjudicating finally upon crimes in courts-leet, whether public or private, is now limited to such minor offences as are still left under the old system of pecuniary compensation. No matters are cognisable in the leet unless they have arisen or have had continuance since the last preceding court.

An amercement is a pecuniary punishment which follows upon every presentment of a default or of any offence committed out of court by private persons. Amercements are to be mitigated in open court by affeerers (afferratores, from afferrare, or afforare, *afferer*, to tax, or fix a price, hence the term afferege, used in the old French law to denote the judicial fixing of a price upon property to be sold). The affeerers by their oaths affirm the reasonableness of the sum at which they have assessed the amercement. This course is confirmed by Magna Charta, which directs that amercements shall be assessed by the peers of the offender, *i. e.* the pares curiæ, or suitors of the same court. The amercements, when settled, are estreated (extracted) from the court-roll by the steward, and levied by the bailiff under a special warrant from the lord or steward for that purpose, by distress and sale of the goods of the party, which may be taken at any place within the district; or the lord may maintain an action of debt for such amercement. For a nuisance, the jury may amerce the offender, and at the same time order that he be distrained to amend it.

The steward of a leet is a judge of record, and may take recognisances of the peace; and he may impose a fine for a contempt or other offence committed in court, as where a party obstructs the jury in the execution of their duties, or by public officers in the discharge of their duties out of court. For the fine so imposed the lord may distrain or bring an action of debt.

Of common right the constable is to be chosen by the jury in the leet; and, if the party chosen be present, he ought to take the oath in the leet; if absent, before justices of the peace. If he refuse to accept the office, or to be sworn, the steward may fine him. If the party chosen be absent and refuses, the jury may present his refusal at the next court, and then he is amerced.

Though the leet has long ceased to be the principal and ordinary court of criminal jurisdiction, its power has been enlarged by several statutes, which give it cognisance over offences newly created, and it does not appear to have been at any time directly abridged by legislative interference. The business of the court has chiefly been affected by the creation of concurrent jurisdictions, particularly that of justices of the peace, who have cognisance of the same matters, as well as of many others over which the court-leet has no jurisdiction.

It is now usual to give fifteen days' notice of holding a court.

The functions of the steward of a court-leet are mostly judicial. Ministerial acts are performed by an inferior officer called the bedel or bailiff, who of common right is appointed by the lord or steward, though by custom he may be chosen by the jury. The steward issues a precept under his seal, addressed to the bailiff of the leet, commanding him to warn the resiants to appear at the time and place appointed for holding the court, and to summon a jury. When the court is opened, he delivers to the steward a list of persons summoned as jurymen, together with the suit or resiant roll. The suit-roll is then called over, and those resiants who are absent are marked to be amerced. The bailiff then gives notice, 'If any man will be essoigned, come in, and you shall be heard.' The steward, having called for the essoigns (excuses), enters them.

The jury is chosen from the body of the suitors, and consists of not less than twelve, nor more than twenty-three. A foreman is then named, who is sworn as follows:—'You shall well and

truly inquire, and true presentment make, of all such articles, matters, and things as shall be given you in charge; the king's counsel, your companions', and your own, you shall keep secret and undisclosed. You shall present no man for envy, hatred, or malice; nor spare any man for fear, favour, or affection, or any hope of reward; but according to the best of your knowledge, and the information you shall receive, you shall present the truth and nothing but the truth.' As soon as the foreman is sworn, and the rest of the jury, they receive a charge from the steward, pointing out the nature of their duties, and of the matters which ought to be presented. The jury make their presentments to the steward, who, in cases of treason or felony, must return the presentments (in these cases called indictments) to the justices of gaol-delivery, if the offenders be in custody; if they be at large, the indictments must be removed into the King's Bench by certiorari, in order that process may issue thereon. In all other cases the steward of the leet has power, upon the complaint of any party grieved by the presentment, or, on the other hand, upon any suspicion entertained as to the concealment of any offence, by non-presentment, to cause an immediate inquiry into the truth of the matter by another jury, though in the former case the more usual course now is by certiorari or traverse.

The ordinary profits of a court-leet are the fines, amercements, and essoign-pence, and belong, in the case of a public leet or tourn, to the king; in the case of a private leet, to the grantee or lord of the leet.

Though the court-leet may now be considered as an antiquated institution in many respects, it is one of our old institutions that is characterised by many valuable features. But the court-leet is not inefficient in all places. See a pamphlet by J. Ross Coulthart, Esq., 'On the Sanatory Condition of the town of Ashton-under-Lyne' (1844).

LEEUWARDEN, the chief town of the Dutch province of Friesland, situated in 53° 12′ N. lat., 5° 43′ E. long., has about 20,000 inhabitants. It is surrounded with an earthen rampart and a wide moat; the broad straight streets are intersected by canals, the banks of which, as well as the ramparts, are planted with trees, and afford very pleasant promenades. The town, which is well built, has manufactures of linen and paper, and has a considerable trade, which is much facilitated by numerous canals. The principal buildings are—the town-hall, the palace of the princes of Orange, a synagogue, and 12 churches, the largest and handsomest of which contains monuments of the princes of the house of Orange.

LEFEBVRE, FRANÇOIS JOSEPH, Duke of Danzig, and Marshal of France, was born of humble parents, at Ruffach, in Upper Alsace, Oct. 25, 1755. He was designed for the ecclesiastical profession, but, having lost his father, he enlisted, when eighteen years of age, as a private soldier in the regiment of French guards. After the Revolution he obtained rapid promotion, and as a captain of his regiment was enabled to render some valuable assistance to the unfortunate family of the dethroned king, Louis XVI. While serving with the army of the Moselle during the whole of the campaign in Germany and the Netherlands, and afterwards with the army of Italy, he repeatedly distinguished himself. On the 25th of March, 1799, was fought the memorable battle of Stockach, in which Lefebvre, with only 8000 men, resisted for many hours the attack of 30,000 Austrians.

At the time when Bonaparte was placing himself at the head of affairs, Lefebvre cordially cooperated with him. He was also instrumental in extricating Lucien Bonaparte from his dangerous position in the stormy meeting of the Council of Five Hundred at St. Cloud. These important services were rewarded by the command of the 17th military division, the head-quarters of which were at Paris.

In the year 1804 he was raised to the dignity of a Marshal of the Empire. He accompanied Napoleon the following year in the Austrian campaign, and in 1806 took an active part at the battle of Jena. In 1807 he was sent with an army of 16,000 men to invest Danzig. He was rewarded for the brilliant success of his expedition with the title of Duke of Danzig.

In the year 1808 Lefebvre joined the Peninsular expedition. In the German campaign of 1809 he rendered himself conspicuous at the battles of Eckmühl and Wagram, and in the dangerous warfare among the passes of the Tyrol. He was also with Napoleon in the disastrous expedition to Russia, and had the command of the old guard. During the retreat he showed considerable military skill. During the campaigns of 1813 and 1814 he appears faithfully to have adhered to the declining fortunes of his master. It is however stated that Lefebvre greatly influenced the abdication of Napoleon, and at the first restoration of Louis XVIII. he was created Chevalier of St. Louis and a peer of France. But, on the return of his former chief from Elba, he again adhered to his fortunes, and accepted a seat in his Chamber of Peers. At the second restoration of the Bourbons he was excluded from the Chamber of Peers, to which he was recalled in 1819, having been a few years previously reinstated in his rank of marshal. He died at Paris on the 14th of September, 1820.

LEFKOSIA. [CYPRUS.]

LEFORT, FRANÇOIS, was the son of Jacques Lefort, member of the Grand Council of Geneva, in which city he was born in 1656. After having served in the Swiss Guards in the service of France, and subsequently in a regiment belonging to the Duke of Courland, in the pay of the Dutch, he distinguished himself in the Russian service, in which he attained the rank of Major. When, in 1689, Peter took refuge in the Troitski convent, Lefort was one of those who joined him there, and on the overthrow of the usurpation of Sophia, which followed, he became the chief minister of the emancipated emperor, and it is said suggested some of the best measures of that reign. He died at Moscow, March 12, 1699.

LEGACY (*Legátum*), a bequest or gift of goods and chattels by will or testament. The person to whom it is given is termed the legatee (*legatárius*).

The bequest is not complete without the assent of the executor or administrator to the will an-

nexed, as the case may be. [Executor.] But, before such assent, the bequest is transmissible to the personal representatives of the legatee, and will pass by his will. The executor or administrator is not bound to admit that there is any thing due to the legatee till the debts of the deceased are paid.

Legacies are of two kinds, general and specific. A legacy is general when it is so given as not to amount to a bequest of a particular thing, or a particular fund of the testator; a specific legacy is a bequest of a specified thing, or a specific part of the testator's estate. There is also a third description of legacy, partaking somewhat of the nature of both kinds already mentioned, as a gift of so much money, with reference to a particular fund for payment. This is called a *demonstrative* legacy, but it so far differs from one properly specific, that, if the fund pointed out fails on any account, the legatee will be paid out of the general assets.

Legacies may be given either absolutely (purè, as the Roman jurists termed it), or upon condition (sub conditione), that is, on the happening of any contingency, provided it must happen, if at all, within the duration of a life or lives in being at the time of the decease of the testator and twenty-one years afterwards, allowing in addition the period of gestation where the contingency depends upon the birth of a child. When a legatee has obtained such an interest in the legacy as to be fully entitled to the property in it, the legacy is said to be *vested*, and this property may be acquired before the right to the possession of the legacy accrues. A vested legacy is transmissible to the personal representatives of the party entitled to it, or passes by a will; a legacy which is contingent or not vested is no property at all with respect to the legatee. This distinction of legacies vested and not vested seems derived from the Roman law, which expresses the fact of vesting by the words 'dies legati cedit.'

Formerly, in all cases when a legatee died before the testator, the legacy lapsed or failed, and went to the person appointed residuary legatee by the testator, or, if there was none such, to the next of kin; and lapse might also take place (as in the case of a legacy given to a legatee at a particular time, or upon condition, or the happening of a contingency) if the legatee died before the appointed time arrived, or if the condition was not performed, or the contingency did not happen. The Statute 1 Vict. c. 26, § 33, has modified the old rule.

The English rules by which gifts of legacies are construed are derived from the Roman law, as appears from Swinburn's 'Treatise on Wills;' and they have been extended and modified by decisions.

It may be stated as a general rule, that legacies are payable twelve months after the death of a testator, and with interest from that time at 4 per cent., unless the testator has made some special provision as to time of payment and interest. When a specific legacy consists of some determinate chattel, whether real, as a lease for years, or personal, as a particular horse, the legatee, after assent by the executor to the legacy, may take possession of it, or sue for it by action at law; but where the specific legacy consists of money, &c., and in all cases of general and of demonstrative legacies, no action at law lies unless the executor has, for some new consideration beneficial to himself, expressly promised payment. As a general rule, therefore, it may be stated that the remedies by legatees against executors are afforded by the courts of equity. (Roper 'On Legacies;' Williams 'On Executors and Administrators.')

On the subject of legacies (legata) under the Roman law, Gaius (ii. 192-255) and the 'Digest,' lib. xxx., xxxi., xxxii., 'De Legatis et Fidei Commissis,' are the chief authorities.

Legacies pay a tax, which is generally to be paid by the executor or administrator, and the stamp which denotes the payment of a legacy is to be affixed to a receipt which is given to the executor or administrator by the person who receives the legacy. There are also stamp-duties on probates of wills and on letters of administration.

LEGATE (from the Latin *Legátus*, which is a participle from *Légo*, and signifies one who is sent with a certain commission). This word had various significations among the Romans. The legates (legati) were the chief assistants of the proconsuls and proprætors in the administration of the provinces. The word legatus also signifies a military officer who was next in rank to the general or commander-in-chief in any expedition or undertaking, and in his absence had the chief command. The word legatus is also often used to denote a person sent by the Roman state to some other state or sovereign power on matters that concerned the public interest.

At the present day a legate signifies an ambassador, or nuncio, of the Pope.

There are several kinds of papal legates; *legatus a latere*, *legatus natus*, &c. Legates a latere are sent on the highest missions to the principal foreign courts, and as governors of provinces within the Roman territory which are called legations (legazioni), when they are governed by a cardinal. Legates of a lower rank than cardinals are called nuncii apostolici (apostolic messengers).

LEGATEE. [Legacy.]

LEGEND (from the Latin word *legendum*, a thing to be read) is used commonly in the sense of fabulous or doubtful narratives between history and fiction, tales of superstition, or other subjects, in which credulity and imposture find free room for exercise. Thus legends have come to signify that which is usually rather matter of tradition than of written evidence. In our old authors the word occurs in its simple meaning.

Legend is also used technically to denote the words encircling a coin. To writing on tablets the word *inscription* is applied, which is also used instead of legend where a sentence, instead of encircling, occupies the place of a device on the coin.

LEGENDRE, ADRIEN MARIE, an analyst, whose name must follow those of Legrange and Laplace in the enumeration of the powerful school which existed in France at the time of the Revolution, was born at Paris in 1751, and died there January 10, 1833. He never filled any

political post, or took any marked part in public matters: he was, we believe, no favourite of any government, and his scientific fame did not procure him more than a very moderate competency.

The writings of Legendre are mostly extended applications of the integral calculus. In 1787 he was appointed one of the commissioners for connecting the observatories of Greenwich and Paris by a chain of triangles. Cassini de Thury had memorialised the British government on the expediency of this step, the execution of which was committed to General Roy on the English side, and to Legendre, Cassini, and Méchain, on the French. Much of the work was completed in 1787, and a memoir of Legendre, published in the volume for that year, upon some theoretical points contains one of those simple and beautiful theorems which carry the name of their inventors with them for ever. It is the celebrated proposition relative to the *spherical excess* of a small spherical triangle. In the construction of the large trigonometrical tables (which still remain unpublished) he contributed some simplifying theorems. In 1806 he published his 'Nouvelles Méthodes pour la Détermination des Orbites des Comètes,' in which he gives a method the peculiarity of which then was that it allowed of the correction of the original observations at any part of the process. It may be doubtful whether the method itself was an improvement upon those which were then in use; and if it were, it has still been superseded by others posterior to it. But this tract is further remarkable by its containing the first proposal to employ the Method of Least Squares.

Legendre applied himself at an early period of his life to the development of those integrals on which the determination of the arcs of an ellipse and hyperbola depend. In the Memoirs of the Academy for 1786 are two papers on the subject written by him. His 'Exercices du Calcul Intégral,' published in 1811, contain, among other matters of high curiosity, an extended view of the same subject. He continued to devote himself assidiously to the cultivation of this new branch of science, and in 1825 and 1826 he produced the two volumes of his 'Traité des Fonctions Elliptiques et des Intégrales Eulériennes,' containing a digested system, with extensive tables for the computation of the integrals. The work was hardly published when the discoveries of MM. Abel and Jacobi appeared. These mathematicians, both then very young, had begun by looking at the subject in another point of view, and had produced results which would have materially simplified a large part of the work of Legendre, if he had had the good fortune to find them. With a spirit which will always be one of the brightest parts of his reputation, Legendre immediately set about to add the new discoveries to his own work; and in 1828 and subsequent years appeared three supplements, in which they are presented in a manner symmetrical with the preceding part of the work, and with the fullest acknowledgment of their value and of the merit of their authors.

To Legendre is also due the collection of the results obtained upon the Theory of Numbers, a subject to which he made very remarkable additions. The second edition of his 'Théorie des Nombres' was published in 1808, and the third in 1830.

The best known of Legendre's works is, as might be supposed, his Elements of Geometry, of which Sir David Brewster gave an English translation in 1824, from the eleventh edition. Legendre published his twelfth edition in 1823. Of the finished elegance and power of this very remarkable work it is not easy to speak in adequate terms: and, next to the Elements of Euclid, it ought to hold the highest place among writings of the kind. But it would not be difficult to show that much of the rigour of Euclid has been sacrificed.

LEGER *Lines and Spaces*, in Music, are the lines and spaces added to the staff when the notes exceed the ordinary compass.

LEGHORN. [LIVORNO.]

LEGION. In a Roman consular army each grand division, corresponding nearly to a modern brigade, was so denominated; and the word indicates a selection of the individuals composing such division. The name is still occasionally given to a body of troops consisting of several regiments or battalions, when raised at a particular place or for a particular service.

The strength of a Roman legion varied at different periods. Romulus divided the men who were able to bear arms into legions of 3000 men, but under other rulers their numbers amounted to more than 6000. The legion declined under the later emperors, and in the time of Constantine did not number more than 1500 men.

The manner in which the soldiers were elected to serve in the legions is fully described by Polybius (book vi. ch. i). When an army consisting of four legions was to be raised, the citizens of the proper ages being assembled on an appointed day in the Capitol, the military tribunes drew out the tribes by lot, and from that which was first called they selected four men of nearly equal age and stature. Of these the tribunes who were appointed to the first legion chose one; those who were appointed to the second legion chose another; and so on. Afterwards the whole body of the tribunes chose four other men, and of these the tribunes of the second legion first chose one; those of the third legion then chose another; and so on, the tribunes of the first legion taking the last man of the four. In like order the election proceeded till the required number of men was obtained.

Immediately after the enrolment, the recruits for the legions being made to advance one by one, each was sworn to be obedient to his commanders, and to execute all the orders which he should receive from them to the utmost of his power.

On the institution of regular bodies of troops by Romulus, he is said to have divided them (probably each legion) into companies of 100 men, and these were called *Manipuli*, from the bundles of grass which served as standards for the people who accompanied him when he attacked the palace of Amulius. The first mention of a cohort occurs shortly after the expulsion of the kings (Liv., ii. 11); and in the time of Polybius the legion was divided into ten cohorts, each of these into

three manipuli (Polyb., b. 11), and each of the latter into two centuriæ.

Servius Tullius is said to have divided the military force into five different classes of troops (Liv., i. 43), which were distinguished by their armour; but from the commencement of the republic, or nearly so, the order of battle consisted of three lines of troops, the *Hastati*, the *Principes*, and the *Triarii* (Liv., viii. 8). The *Vélites* (light troops or skirmishers) had no particular station.

All the three classes were completely armed with cuirass, helmet, and greaves. Their buckler was 4 feet long and 2½ feet broad, and five arrows were placed in its concavity, to be thrown when necessary. Each man was provided with a long and a short sword, the blade of the former being strong, and made either to cut or thrust; and he carried, besides, two javelins, or *pila* (Polyb., b. vi).

The front of the legion, when in order of battle, was formed by ten corps of the hastati, each corps being arranged with 16 men in front, and 10 in depth. The second line, or that of the principes, was of the same strength, and was drawn up in the same manner. The line of triarii consisted also of ten corps; but these had only 10 men in front and 6 in depth. Every legionary soldier was allowed five feet in front, and as much in depth, in order that he might be enabled to make free use of his arms.

The cavalry of a Roman legion was divided into ten *turmæ*, of about 30 horses each, who, in order of battle, were drawn up with 8 in front and 4 in depth. Each legion of the allies had, however, 600 horsemen; so that the cavalry of a consular army (consisting of two Roman legions and two legions of allies) amounted to 1800 men, who were disposed on the wings of the legion, in one line or two, according to circumstances. The legionary cavalry were furnished with cuirasses and helmets, and they were accompanied by light-armed horsemen, who served as archers.

LEGION OF HONOUR, an order of merit in France, instituted by Napoleon during the year 1802, as a recompense for military and civil services. This order consists of five divisions: *chevaliers*, of whom the number is unlimited, *officers*, *commanders*, *grand officers*, and *grand crosses*. The members swear fidelity to the king, to the charter, and to the laws. The ordinary regulations require twenty-five years' service during peace, and half that period during war, in a civil or military capacity, to be admitted to the first grade. But, in time of war, a brilliant exploit, or a severe wound, are deemed sufficient to qualify for admission into this order. This honour however is frequently granted to any distinguished person at the pleasure of the king.

In the year 1815, on the second restoration of the Bourbons, the entire number of members of all the different divisions of this order were 30,747. Louis Philippe distributed the decorations with a prodigal hand; but the new republic (1849) has been more sparing.

A full account of this order and of its most distinguished members may be found in a work entitled 'Fastes de la Légion d'Honneur,' 4 vols., Paris, 1842 and 1844.

LEGISLATION. A magistrate who propos a law in Rome for the adoption of the assembly citizens was said *legem ferre* (as we say, to *bri* a bill into parliament); and the law, if carrie was said to be *perlata*, or simply *lata*. Hen the term *legum lator*, or *legislator*, was used, synonymous with the Greek *νομοθέτης*, in the sen of a lawgiver. From *legislator* have been form *legislation*, *legislative*, and *legislature* (the la word signifying a person or body of persons exe cising legislative power).

Legislation means the making of positive la A general command, or law, would be nugator if it was not applied in practice to the cases fallin within its scope, and if the pains denounced f the violation of it were not inflicted on transgre sors. The execution of the general commands, laws, of a sovereign government is therefore a essential part of the business of a governmen Accordingly the ordinary functions of a gover ment may be divided into the two classes of *legi lative* and *executive*.

An *executive* command, or act, of a sovereig government is a special command issued, or a done, in the execution of a law previously est blished by the government. Executive command or acts are of two sorts, viz., *administrative* an *judicial*. The distinction between these two sor of executive commands or acts may (in conformi with modern phraseology) be stated as follow A judicial proceeding is a declaration, by a com petent authority, that a person has (or has no brought himself within the terms of a certai penal provision, or that he has (or has not) a ce tain legal right or obligation which another di putes with him. An administrative proceeding for the sake of carrying a rule of law into effec where there is no question about the legal culp bility, or dispute about a legal right or obligatio of a person. In an administrative proceeding t government functionary acts, or may act, spo taneously and from his own information; in a j dicial proceeding he does not act until he is set motion by others, and he can only take notice the facts which the litigant parties bring befo him. A judge cannot act until his court is (use the French phrase) *seized*, or *saisi*, with t question; or (to use the language of our ecclesia tical courts) it is necessary 'to promote (or set motion) the office of judge.'

The division of the functions of governme into legislative and executive is not exhaustiv inasmuch as neither class comprehends acts or sp cial commands not founded on a previous gener command or law, in other words, *privilegia*; well as treaties and other compacts of a sovereig government.

Positive Law may be viewed from the two f lowing aspects. First, it may be considered as organic system, consisting of coherent rules, e pressed in a technical vocabulary. Secondly, rules may be considered singly, with reference their end or object. Law viewed from the form aspect is properly the subject of the science jurisprudence. [JURISPRUDENCE.] Law view from the latter aspect is the subject of a depa ment of political science which is generally term

legislative science. Legislation is also concerned about the technical form, as well as the object, of a law; and therefore legislation requires the aid of jurisprudence.

The distinction between the technical form and the substance of a law is also important with reference to the question of *Codification*, i. e. the making of a code of laws.

The making of a code of laws may involve any one of the three following processes:—1. The formation of a new system or body of laws. 2. The digestion of written laws, issued at various times, and without regard to system. 3. The digestion of unwritten law, contained in judicial decisions and authoritative legal treatises. The *codices* of Theodosius and Justinian are examples of the digestion of written laws. [CONSTITUTIONS, ROMAN.] The 'Digest' or 'Pandects' of Justinian afford an example of the digestion of unwritten law. The English statutes for consolidating various branches of the criminal law, the bankruptcy laws, the customs laws, the distillery laws, &c., are instances of the digestion of the written law of England. The digestion of existing law, whether written or unwritten, requires merely juristical ability; the making of new laws requires, in addition to the knowledge and skill of the jurist, that ability which we have termed legislative. In other words, the making of new laws requires attention to their end, design, or object, and technical skill in the composition or drawing of them.

LEGNANO. [VENETA.]

LEGRAND, JACQUES GUILLAUME, a French architect, was born at Paris, May 9, 1753. One of his most noted works, which he executed in conjunction with Molinos, was the timber cupola of the Halle aux Blés. The Théâtre Feydeau, the restoration of the Fontaine des Innocens, of the Halle aux Draps, and of the interior of the Hôtel Marbœuf, besides a number of designs for private individuals, were executed by him. He died Nov. 10, 1806.

LEGU'MIN, a peculiar vegetable product obtained by Braconnot from peas, and which he considers as a vegetable alkali. It appears to be a substance intermediate between gluten and vegetable albumen; it differs from the first in being insoluble in alcohol, and from the last in readily dissolving in the alkaline carbonates. It contains some sulphur, and also azote, but less than animal albumen. It exists in peas and beans to the amount of about 18 per cent.

LEGUMINO'SÆ, or FABA'CEÆ, a very extensive natural order of plants inhabiting the coldest and hottest, the driest and dampest, parts of the world; assuming the greatest varieties of form and size, some being among the smallest of flowering plants, others forming the largest trees in tropical forests. They vary also in an extraordinary degree in their sensible qualities, some being eatable, as peas, beans, and other pulse; others poisonous, as *Pancratium*, *Taphrosia*, and *Cytisus*; some possessing a fragrant volatile oil, others destitute of all trace of such a substance.

The species amount to some thousands, and are conveniently divided into three suborders, *Papilionaceæ*, *Cæsalpineæ*, and *Mimoseæ*.

Papilionaceæ have what are called papilionaceous flowers, resembling a butterfly; and it is here that the great mass of the order occurs, especially in the colder parts of the world. Peas, beans, clover, sainfoin, lucerne, liquorice, indigo, medicks, and trefoils, lupines, and numerous other common European genera, belong to *Papilionaceæ*.

Cæsalpineæ includes the Cassia, which furnishes the senna-leaves of the shops; and also the Tamarind and Algaroba Beans, the trees yielding logwood, Brazil-wood, Sappan-wood, &c., and *Hymenæa*, from which Gum Animi is procured.

Mimoseæ comprehends the species yielding the gums Arabic, Senegal, Sassa, and others. Catechu is the extract of the astringent bark of *Acacia Catechu*, and rosewood is said to be the timber of some Mimosa inhabiting the interior of Brazil. One of the most striking phenomena among the plants of this order is the excessive irritability observable in the leaves of certain species of *Mimosa*, such as *M. pudica*, *M. sensitiva*, &c., which are hence called Sensitive Plants. It is, however, a special peculiarity, and not one of general occurrence, unless the folding up at night of the leaves of the whole suborder be regarded as an instance of the same irritable quality in a low degree.

LEIBNITZ, GOTTFRIED WILHELM, was born July 3, 1646, at Leipzig. In his fifteenth year he was placed at the university of the same place. Although law was his principal study, he combined the legal lessons of the elder Thomasius with those of Kuhn in mathematics, and applied at the same time with great diligence to philology, history, and, in short, to every branch of knowledge. Of ancient writers, Plato, Aristotle, and the Pythagoreans seem to have exercised the greatest influence on his mental character, and his profound knowledge of their writings has furnished many an element in his own philosophy. After further prosecuting his mathematical studies at Jena under Erhard Weigel, Leibnitz returned to Leipzig, where he passed successively to the degrees of bachelor and master in philosophy. On the latter occasion (A.D. 1664) he read his treatise 'De Principio Individuationis,' in which he took the side of the nominalists against the realists. His pursuits at this time were chiefly of a mathematical and juridical character. In 1664 appeared the treatise 'Quæstiones Philosophicæ ex Jure collectæ,' which was followed in the next year by the 'Doctrina Conditionum.' The treatise 'De Arte Combinatoria' was published in 1666. Notwithstanding such early proofs of his genius and talents, Leibnitz was refused a dispensation of age which he had asked for at Leipzig in order to take the degree of Doctor of Laws, which however he obtained at Altorf. His exercise on this occasion was published under the title 'De Casibus in Jure Perplexis,' which was everywhere received with approbation. Declining a professorship here offered to him, he proceeded to Nürnberg, where he joined a society of adepts in the pursuit of the philosopher's stone, and being appointed secretary, was selected to compile their most famous works on Alchemy. For such an occupation he is said to have proved his fitness by composing a letter,

requesting the honour of admission, so completely after the style of the Alchemists, that it was unintelligible even to himself. From these pursuits he was removed by the Baron Von Boineburg, chancellor to the Elector of Mainz, who invited him to proceed to Frankfort in the capacity of councillor of state and assessor of the chamber of justice. He here composed the valuable and important essay 'Nova Methodus docendi discendique Juris, cum subjecto catalogo desideratorum.' At this time Leibnitz began to prosecute the study of philosophy with greater energy, and to extend his fame to foreign countries by the republication of the work of Nizolius 'De veris Principiis et vera Ratione Philosophandi,' to which he contributed many philosophical notes and treatises. To this date belong two original compositions which are remarkable for their boldness of views, and as containing the germ of his later philosophical system. Of these two works the 'Theoria Motus Concreti' was communicated to the Royal Society of London, and the 'Theoria Motus Abstracti' to the Academy of Sciences of Paris. The latter city he first visited in 1672, in company with the son of his patron, and there formed the acquaintance of the most learned and distinguished men of the age. Leibnitz next proceeded to London, where he became personally acquainted with Newton, Oldenburg, Wallis, Boyle, and others, with many of whom he had previously maintained an active correspondence. He visited London a second time, in order to make known his mathematical studies, and to exhibit his arithmetical machine. From London Leibnitz returned to Hanover, where he was engaged in arranging the library and in the discovery and development of the method of infinitesimals. [Fluxions.] To this period belong also important works of a mixed historical and political nature. In 1683 he joined Otto Mencke in publishing the 'Acta Eruditorum' of Leipzig, and from 1691 he was also a constant contributor to the 'Journal des Savans,' in which many of his most important essays on philosophy first appeared. To this period belong the composition of the 'Monadologie' and the 'Harmonie Préétable.' In 1702 Leibnitz was appointed president of the Academy of Sciences at Berlin, which the Elector of Brandenburg, afterwards Frederick I. of Prussia, had established at the instance of his queen, a princess of the house of Brunswick, and by the advice of Leibnitz himself. In 1710 the 'Theodicée' was published with a view to oppose the tendency of the writings of Bayle; and two years afterwards the 'Nouveaux Essais sur l'Entendement Humain,' in answer to the essay of Locke. In the previous year Leibnitz formed the personal acquaintance of Peter the Great, who, at Torgau, consulted him on the best means to be adopted for the civilisation of Russia, and rewarded his valuable suggestions by the title and dignity of councillor of state and a pension of 1000 rubles. Shortly afterwards, at the instance of Prince Ulrich of Brunswick, the emperor, Charles VI., elected him aulic councillor and baron of the empire; and, in consequence, he visited Vienna, where he became acquainted with the Prince Eugene of Savoy, and the Chancellor Count Sinzendorf. Upon the elevation of the Elector of Hanover to the throne of England, Leibnitz returned to Hanover, where, after the publication of a few political and philosophical works, he expired on the 14th November, 1714. He was buried on the esplanade at Leipzig, where a monument, in the form of a temple, indicates, by the simple inscription 'Ossa Leibnitii,' the place of his burial.

The first object of the philosophical labours of Leibnitz was to give to philosophy the rigour and stability of mathematical science. Leibnitz assumed the existence of certain universal and necessary truths which are not derived from science, but grounded in the very nature of the thinking soul. As the object-matter of mathematics may be supposed to be constructed of points or units, Leibnitz was led to the assumption of certain primary constituents of all matter. These are his famous monads, which form the basis of his system. These monads are simple substances without parts, out of which all bodies are compounded by aggregation. Being without parts, they are necessarily unextended, indivisible, and without figure. As such, they are incapable of dissolution, and without natural decay or production, which is only possible in composite bodies. The monads, therefore, were created at once and momentarily, and in the same manner they must be destroyed at last for ever.

We must refer to the 'Penny Cyclopædia' for an outline of the philosophical system by which Leibnitz sought to correct the erroneous opinions of his age, which had been drawn from the theory and established on the authority of Des Cartes. The broad and marked distinction which the latter had drawn between matter and mind had led to an inexplicable difficulty as to the reciprocal action of the body and soul; to get rid of which Spinosa had advanced his theory of substance, and denied or got rid of the difference. Leibnitz attempted to solve this difficulty by resolving all things into spirit, and assuming nothing but mental powers or forces. Nevertheless he has only presented the dualism of the Cartesian theory under another form; and the equal difficulty of explaining the community of action between the conscious and unconscious forces so as to account for the reciprocal influence of body and mind forced him to have recourse to the gratuitous assumption of the pre-established harmony. As to the charge of fatalism, which Dugald Stewart has objected to, his objection seems to have arisen from that antagonism of error which takes refuge from a blind necessity in irrational chance. The theory of optimism has been the subject of the satire of Voltaire; but it is not more misrepresented in 'Candide' than in the 'Essay on Man.' Pope and Leibnitz agree in the position, that of all possible systems infinite wisdom must form the best; but, by the coherency of all, the former understood the coexistence of all grades of perfection, from nothing up to Deity; the latter, that mutual dependence of all in the world by which each single entity is a reason of all others. By the fulness or creation Leibnitz denied the existence of any gap in the casual order of coexistent things; Pope asserted by it the unbroken series of all degrees

of perfection. The Divine permission of evil Pope referred to the indisposition of the Deity to disturb general by occasional laws. There is consequently evil in the world which the Deity might have got rid of, if he were willing in certain cases to interrupt his general providence. Consequently he admits evil in the world which does not contribute to the perfection of the whole. Leibnitz however denies that God could remove the existing evil from the world without prejudice to its goodness. He moreover does not admit of the opposition of general and particular providence, but makes the general law of the universe to be nothing else than the totality of all special laws.

Leibnitz has been principally spoken of as a metaphysician, but it should be remembered that his mathematical fame is as high among mathematicians as his metaphysical reputation is among metaphysicians, and perhaps higher.

Of the works of Leibnitz several editions and collections have appeared. The two principal are the following: 'G. W. Leibnitzii Opera omnia nunc primum coll. stud. Dutens,' Genevæ, 6 vols. 4to., 1768; and 'Œuvres Philosophiques, Lat. et Franc., de feu M. Leibnitz, pub. par M. Raspe,' Amstelod., 1765, 4to. The 'Commercium Philosophicum et Mathematicum,' two volumes quarto, containing the correspondence of Leibnitz with John Bernoulli, was published at Lausanne and Geneva in 1745.

LEICESTER. [LEICESTERSHIRE.]

LEICESTER, ROBERT DUDLEY, EARL OF, was born about 1531. His father, the Duke of Northumberland, was executed for his adherence to Lady Jane Grey. The son was imprisoned for a time, but was soon liberated, and afterwards made master of the ordnance by Queen Mary. On the accession of Queen Elizabeth he became a favourite, and received at her hands gifts and titles, the earldom of Leicester being the last and highest. To retain this favour, or, as it has been suggested, in order to marry Elizabeth, Dudley is suspected of having, in 1560, caused the death of his wife, Amy Robsart, whom he had married when very young. He is also accused of having instigated an attempt which was made to poison Lady Sheffield, by whom he had a son; and for this crime, if he committed it, he doubtless had a similar motive. His marriage with the widow of Lord Essex was very nearly depriving him of the queen's favour; but, notwithstanding her temporary anger, his influence over her remained undiminished. This marriage, too, involved another case of suspicion: Lord Essex had died in a very unaccountable manner only two days before it took place.

Successful as a courtier, Leicester proved his inefficiency as a soldier by his conduct of two separate commands with which he was intrusted in the Low Countries in 1585 and 1587; and it was found necessary in both cases to recall him. The last trust conferred upon him was in 1588, when he was appointed Lieutenant-General of the infantry mustered at Tilbury Fort, for the purpose of resisting the Spaniards. This was the year of his death, which took place at Cornbury in Oxfordshire. It was in the previous year that he advised Elizabeth to put Mary, queen of Scots, privately to death.

LEICESTER OF HOLKHAM, THOMAS WILLIAM COKE, EARL OF, was the son of Mr. Wenman Roberts, who, succeeding to the Leicester estates on the title becoming extinct by the death of the earl in 1759, assumed the surname and arms of Coke. The subject of this notice was born May 4, 1752.

His father, who was member for the county of Norfolk, died in 1776, upon which his son succeeded him in the representation of the county. He was returned again for Norfolk at the next general election in 1780; but, after the dissolution in March 1784, he was one of the numerous supporters of the unpopular Coalition Ministry. He was re-elected in 1790; and also in 1796 and in 1802. At the next general election, in 1806, he was returned by a majority of 4118 to 3772 over Mr. Windham, but was unseated by a Committee of the House; upon which he was elected for the town of Derby. At the next general election, in 1807, Mr. Coke became again member for Norfolk, which he continued to represent down to his retirement from the House of Commons in 1832. On the 21st of July, 1837, he was raised to the upper house as Earl of Leicester of Holkham.

He died at Longford Hall, Derbyshire, June 30, 1842, at the age of ninety. He was twice married: first, in 1775, to Jane, daughter of James Lennox Dutton, Esq., who died in 1800, and by whom he had three daughters, and many grandchildren and great-grandchildren; secondly, in 1822, to the Lady Anne Amelia Keppel, third daughter of the Earl of Albemarle, who brought him five sons and a daughter. In politics the Earl of Leicester was a steady adherent of the Whigs. He was a great authority in agricultural matters, and possessed considerable county influence.

LEICESTERSHIRE, an English county, bounded N. by Nottinghamshire, N.E. by Lincolnshire, E. by Rutlandshire, S.E. by Northamptonshire, S.W. by Warwickshire, and N.W. by Derbyshire. It is included between 52° 24′ and 52° 59′ N. lat., and between 0° 39′ and 1° 37′ W. long. The greatest length, N. by E. to S. by W. is 44 miles; the greatest breadth, at right angles to the length, is 40 miles. The area is 806 square miles. The population in 1841 was 215,867.

Surface, Rivers, &c.—The surface of Leicestershire consists almost entirely of gently rising hills. The north-eastern part is occupied by the southern extremity of the Kesteven Cliffe Row. The south-eastern portion is occupied by the hills which separate the basin of the Soar from that of the Welland. The north-western portion constitutes the district which, though now bare of wood, retains its ancient designation of Charnwood Forest. This district is occupied by a group of hills of inconsiderable elevation, but of a rugged character, with distinct and sharp prominences. Bardon Hill, between Leicester and Ashby, about 850 feet high, has one of the most extensive prospects in England.

The eastern portions of the county are mostly occupied by the oolite, the lias, and the intermediate formations. The rest of the county, with

the exception of Charnwood Forest, the coal-fields near Ashby-de-la-Zouch, and some isolated hills of mountain limestone to the north-west of Charnwood Forest, is occupied by the new red sandstone. The Ashby coal-fields lie one to the north-east, the other to the south-west of the town, and extend into Derbyshire. Isolated beds of mountain limestone are quarried in many places. Charnwood Forest district is occupied by rocks of the transition series, sienite, greenstone, and slate. Coarse slate, gypsum, limestone, freestone, and brick-clay are procured within the county.

Leicestershire is chiefly included in the basin of the Trent, which just touches the county, and for a few miles divides it from Derbyshire. The principal tributary of the Trent belonging to this county is the Soar, which is formed by the junction of several small streams that rise near the south-western border of the county; it flows past Leicester and Loughborough to the Trent, near Kegworth. The Wreak rises in Rutlandshire, and joins the Soar near Mount Sorrel. The Anker skirts the border of the county. Near Atherstone it joins the Tame, a feeder of the Trent, at Tamworth. The Sence joins the Anker. The Mease, the Deven, and the Smyte are small feeders of the Trent. The Avon, a tributary of the Severn, forms the boundary of the county for seven or eight miles on the southern side. The Swift, a small stream which flows by Lutterworth, falls into it. The Welland forms part of the Northamptonshire boundary of the county.

Canals and Railways.—Leicestershire has several canals. The Leicester Navigation consists party of a canal, and partly of the river Soar made navigable. It extends from Loughborough to Leicester, and is about 11 miles long. The Leicester and Melton Mowbray Navigation completes the river connection between those two towns. The Leicestershire and Northamptonshire Union Canal extends from the Leicester Navigation at Leicester, to Foxton near Market Harborough, with a cut from Foxton to Harborough. The Grand Union Canal forms a communication between the Grand Junction Canal, at Long Buckby in Northamptonshire, and the Leicestershire and Northamptonshire Union Canal at Foxton. The Oakham Canal runs from Oakham to Melton Mowbray. The Ashby-de-la-Zouch Canal commences in the Coventry Canal, about three miles from Nuneaton in Warwickshire, and runs to the coal-field south-west of Ashby.

Besides a few mineral railways connected with canals, there are many lines of passenger railways, wholly belonging to the Midland Company. If the South Midland portion of this scheme should be carried out, the Leicestershire railways will then comprise lines from Leicester to Derby and Nottingham, Leicester to Ashby and Burton, Leicester to Hinckley and Nuneaton, Leicester to Lutterworth and Rugby, Leicester to Market Harborough, and Syston to Melton and Oakham.

Climate and Agriculture.—The climate of Leicestershire is mild and genial, without being so moist as in those counties which lie nearer the Atlantic. There are few high hills to intercept the clouds. The soil is loamy, without the extremes of stiff clay, loose sand, or chalk. The most fertile soils are almost invariably kept in pasture, for which this county is pre-eminent. Out of above 500,000 acres of surface, fully one-half is in permanent grass. The quantity of woods or wastes is very small. Grazing and breeding cattle and sheep are the chief objects of the Leicestershire farmers, and they have succeeded admirably both with oxen and sheep. The manure thus brought upon the fields, and the large culture of turnips and green crops for the cattle, keep the arable land in good condition. Most of the improved modern instruments, such as scarifiers, spiked rollers, and drills, have been introduced, and are used in the larger farms, which are chiefly in the hands of the proprietors. The course of crops of the grazier, breeder, or principal farmer is very commonly as follows:—On good friable loams, 1, a green crop to clean the land, turnips, rape, or cabbages; 2, barley, with clover and grass seeds; 3 and 4, clover mown and pastured; 5, oats or wheat. On a good heavy loam the following has been observed:—1, beans drilled; 2, wheat; 3, green crops; 4, barley and seeds; 5 and 6, grass.

The natural meadows along the banks of the rivers are considerable, and most of them of excellent quality. The produce in hay is from one and a half to two tons per acre.

The county contains many large dairies, and produces excellent cheese, especially the Stilton cheese. The principal breed of cattle in Leicestershire is the improved long-horn, which owes its high character to the intelligence, activity, and perseverance of Mr. Bakewell. The Leicestershire sheep are also renowned. They are large, with very long wool, and fatten very readily at an early age. Many good horses are bred, and the rich pasture favours the rearing of this useful animal. Hogs have been improved in Leicestershire, as well as other animals.

Divisions and Towns.—Leicestershire is divided into 6 hundreds. It is in the diocese of Lincoln and province of Canterbury. It is in the Midland Circuit. The assizes are held at Leicester. For parliamentary purposes the county is divided into North Leicestershire and South Leicestershire, each of which returns 2 members to parliament; besides which, 2 members are returned for the borough of Leicester: total, 6.

The following are the principal towns, with the population of each in 1841:—

Ashby-de-la-Zouch, a market-town, is situated on the Mease, a tributary of the Trent, 17 miles N.W. from Leicester. Originally it was called Ashby; it received the distinctive addition of De la-Zouch from the Zouches who were formerly lords of it. Ashby contains an ancient and handsome church. On the south side of the town stand the ruins of Ashby Castle in which Mary queen of Scots, was imprisoned. Woollen and cotton stockings and hats are the chief articles of manufacture. Coal and ironstone are worked in the neighbourhood of the town. There is a canal from the Coventry Canal navigation to the neighbourhood of Ashby, and a railroad from the canal to the town. Population of the parish, 5652.

Bosworth (commonly called *Market Bosworth*) is situated on an eminence, 12 miles W. from Leicester. The decisive battle between Richard III. and the Earl of Richmond, when the death of the former, after a bloody struggle of two hours' duration, terminated the long strife between the houses of York and Lancaster, was fought August 22, 1485, on a plain about one mile south of Bosworth. Population of the parish, 1135.

Hinckley is on the Chester and Liverpool mail-road, 12½ miles S.W. from Leicester. The church is large and ancient. The staple manufacture of the town is that of stockings. Population of the parish, 6356.

Leicester, a parliamentary borough, municipal borough, and the county-town of Leicestershire, is on the east bank of the Soar. It was known to the Romans by the name Ratæ, and was then a place of importance. It was a place of importance under the Saxons, but its history is uncertain.

The town is irregularly laid out: the principal line of street is nearly a mile. The most ancient church is St. Nicholas. It is chiefly of Norman architecture. St. Mary's church is a large building, partly of Norman, partly of Early English architecture. The church of St. Martin is an ancient cross church, partly of Early English and partly of Perpendicular architecture. This church is the largest in Leicester. All Saints is a small church, chiefly in the Early English style. St. Margaret's is a handsome church, partly Early English, with a lofty Perpendicular tower. There is a district church in St. Margaret's parish, lately erected in the Perpendicular style.

The guildhall is a commodious building; the borough gaol and house of correction are modern buildings. A new county gaol and house of correction have been built on the south side of the town. There are four bridges over the Soar.

The staple manufacture of the town is stockings. Lace-making is also carried on to some extent. In the market-place is the Exchange. The south branch of the Midland Railway passes through Leicester. The distance from London by the railway is 103 miles; by the road, 96 miles.

Leicester has returned two members to parliament since the time of Edward I. Population of the parliamentary borough, 50,365. The municipal borough is divided into 7 wards, and is governed by 14 aldermen and 42 councillors: population, 48,167.

Loughborough, a market-town, is 11 miles N. by W. from Leicester. The church is a handsome building in the Perpendicular style. The chief manufactures of the town are hosiery, bobbin-net lace, cotton goods, and shoes. The Leicester Navigation and the Loughborough Canal, communicating with the Soar, tend much to the prosperity of the place. There is a branch railway from Leicester to Loughborough. Population of the town, 10,025.

Lutterworth, a market-town, is 13 miles S. by W. from Leicester. The town consists of one main street and several smaller ones. The church is a large handsome building. The chief manufacture of Lutterworth is of coarse hosiery. Population of the parish, 2531.

Market Harborough, a market-town, is 14½ miles S.E. from Leicester. The town stands on the north bank of the Welland, and consists of one principal street and several smaller ones. The only manufacture carried on is that of carpets. Population of the chapelry, 2433.

Melton Mowbray, a market-town, is 15 miles N.E. from Leicester. The town is in a valley, on the river Eye, over which are two bridges, and another over the Sleaford Brook. The church is large, partly in the Early English style. The chief manufacture is bobbin-net lace. Population of the parish, 3740.

Mount Sorrel is 7½ miles N. by W. from Leicester on the road to Loughborough. The town is in a very romantic situation, on the left bank of the Soar, and consists chiefly of one street. There is a small market-house. The principal manufacture is of stockings. Population of the chapelry, 1536.

History, Antiquities, &c.—Leicestershire was anciently comprehended in the territory of the Coritani: and when the Romans had subjugated Britain, and divided it into provinces, it was included in the province of Flavia Cæsariensis. A Roman milestone, portions of wall, and numerous coins, urns, household utensils, and tesselated pavements, of Roman work, have been met with near Leicester. South of Leicester town are two remarkable parallel embankments, called the Raw Dykes, extending about three furlongs in length, and about sixteen yards apart. They have been commonly regarded as the limits of a race-course, and as of British origin; but neither of these points is ascertained. There are many traces of Roman encampments in the county. The Roman roads named Watling Street, Fossway, Via Devana, and Salt-way, cross portions of the county.

During the Heptarchy, Leicestershire was included in the kingdom of Mercia. In the year 680, or according to others 737, Leicester was made the seat of a bishopric, which existed one or two centuries. By the treaty between Alfred and Guthrun the Dane (A.D. 878 or 880) Leicestershire was included in the Danelagh or Danish territory; and Leicester became one of the great Danish burghs. It was recovered by the Saxons during the reign of Edward the Elder.

Upon the Norman Conquest, Leicestershire was divided between the followers and relatives of the Conqueror. Several of these or their descendants, to secure the territory thus acquired, erected castles or repaired older ones at Leicester, Mount Sorrel, Shilton, Whitwick, Groby, Hinckley, Donnington, Melton Mowbray, Ravenston, Thorpe, Sauvey, and Belvoir. Of these castles, except that at Ashby-de-la-Zouch, there are few remains. The present Belvoir Castle is a more modern edifice. There were several monastic establishments in the county, but there are no remains of any of these deserving notice.

In the civil war of Charles I. the men of Leicestershire seem generally to have taken the side of the Parliament.

LEIGHLIN. [FERNS.]

LEIGHTON, ROBERT, D.D., archbishop of Glasgow, a divine, celebrated for his moderation

and enlightenment during a time of great excitement. He presided over the University of Edinburgh; but, when Charles II. attempted to introduce Episcopacy into Scotland, he was nominated to the bishopric of Dumblane. His conduct won him the affections of even the most rigid Presbyterians. He was afterwards induced to accept the archbishopric of Glasgow, which however he resigned, and retired to England, where he died in 1684. The best edition of his works, with an account of his life, was published in 1808, 6 vols. 8vo.

LEIGHTON BUZZARD. [BEDFORDSHIRE.]

LEININGEN, formerly a county situated between the Lower Palatinate and the bishoprics of Spires and Worms, gives title to one of the German princely houses. The principal line obtained in 1779 the dignity of princes of the empire. In 1803 it lost its possessions on the left bank of the Rhine, and obtained, instead, a territory of 545 square miles, 425 of which are in Baden, 110 in Bavaria, and 10 in Hesse-Darmstadt. The principality was mediatised in 1806. The population of the principality is now about 112,000. The prince's residence is at Amorbach, in the Bavarian Odenwalde, which has a population of about 3000. The religion is Lutheran. There are four other branches of the house of Leiningen, two Lutheran and two Catholic; the head of each branch has the title of Count.

LEINSTER, a province of Ireland, containing the counties of Carlow, Dublin, Kildare, Kilkenny, King's County, Longford, Louth, Meath, Queen's County, Westmeath, Wexford, and Wicklow. It lies between 52° 6′ and 54° 7′ N. lat., and between 6° and 8° 3′ W. long. It is bounded E. by the Irish Channel, S. by the Irish Channel and the county of Waterford, W. by Tipperary, Galway, Roscommon, and Leitrim, and N. by Cavan, Monaghan, and Armagh. The greatest length, from the mouth of Waterford Harbour to the head of Carlingford Bay, is about 138 miles; the greatest breadth, from the Shannon, a little below Shannon Harbour to Dalkey, near Kingstown, is about 80 miles. The area is 7619 square miles, or 4,860,642 acres. The population in 1841 was 1,973,731.

Of the four provinces of Ireland, Leinster possesses the greatest advantages in point of soil and surface, being little encumbered with mountains, and having consequently superior facilities for internal communication. The navigable Shannon forms part of its western boundary, and the navigable Barrow intersects its central and southern counties. The Boyne also, the basin of which lies within its north-eastern limits, is partly navigable, and the Royal Canal and Grand Canal traverse it from east to west. The coast is inferior in point of natural harbours to that of the remainder of the island, but it is more sheltered from the prevalent winds.

Upon the coming of the English in 1170, the present province was divided into the two petty kingdoms of Meath and Leinster, and embraced also a part of the then kingdom of Ulster, in the present county of Louth. The first counties erected were those of Dublin, including the present county of Wicklow; Meath, including the present West Meath and Longford; Louth; Kildare, including the present King's and Queen's Counties; Carlow, Kilkenny, and Wexford. Meath was divided into Meath and West Meath in the reign of Henry VIII.; King's County and Queen's County were separated from Kildare, and erected into separate counties in that of Mary; Longford was made shire-ground in the time of Elizabeth; and Wicklow was finally separated from Dublin and made a county in the reign of James I.

The ancient kingdom of Leinster, including all the counties south of Meath, with the exception of Dublin, was inherited by the descendants of Eva, daughter of Dermod MacMurrogh, and wife of Earl Strongbow. Meath was bestowed on Hugh de Lacey, and descended to the families of De Verdon and Geneville. Almost all the inheritors having ultimately become absentees, the native Irish of Carlow, King's County, Queen's County, and West Meath seized on their estates, and obliterated all traces of the English law from the western and some of the midland parts of the province; nor was it till the reign of Elizabeth that the whole was brought again under a regular government. The counties of Louth, Meath, Dublin, Kildare, and Wexford have not shaken off the English law or abjured English manners at any time since the Conquest.

LEI'ODON, a genus of fossil reptiles. (Owen.) One species found in the chalk of Norfolk.

LEIOTRICHA'NÆ, a sub-family of birds established by Mr. Swainson. Legs large, robust, syndactyle. Hind-toe longer than the outer. Wings short and rounded. Bill strong; the gonys ascending. The only genera are *Leiothrix* and *Pteruthius*. Locality, India.

LEIPZIG, one of the four circles of the kingdom of Saxony, is bounded W. and N. by Prussia, E. by the circle of Meissen, and S. by that of the Erzgebirge and the principality of Saxe-Altenburg. Its area is 1336 square miles, and the population, in 1846, was 417,041. The country is level, except in the south and south-east, where there are some offsets of the Erzgebirge. The soil is fertile and well cultivated; but the country is deficient in wood, which is procured from the Erzgebirge and the circle of Voigtland. Potters' clay, limestone, marble, porphyry, and jasper are found. The breed of sheep is good, and great numbers are reared. The manufactures consist of woollens, cotton, and linen. The climate is temperate and healthy.

LEIPZIG, the second city in the kingdom of Saxony, and capital of the circle of Leipzig, stands in 51° 20′ 16″ N. lat., 12° 21′ 45″ E. long., in an extensive plain watered by the Pleisse, at a distance by railway of 71 miles N.W. from Dresden, and 133 S. by W. from Berlin. The town, including its suburbs, is nearly a mile in length, from N. to S., and three quarters of a mile in breadth. It was formerly well fortified, but the ramparts have been converted into public walks and gardens. The only remaining part of the fortifications is the castle, called the Pleissenburg, upon which the observatory now stands, in 51° 20′ 19″ N. lat., 10° 1′ 45″ E. from Paris. The ordinary popula-

tion is between 50,000 and 55,000; but at fair-time it increases to 100,000 or more.

Leipzig is not regularly built; the streets are generally narrow, though well paved and lighted; but it contains many very handsome parts, numerous elegant public buildings, private houses resembling palaces, and many seats, with fine gardens, in the suburbs. The most remarkable edifices are—the churches of St. Thomas, St. Nicholas, St. Paul, and St. John; the university buildings; the theatre; the town-hall, built in 1599; and the cloth-hall. The great building called Auerbach's House is, in the time of the fairs, a kind of bazaar, where the finest and most costly articles are exposed for sale. There are numerous excellent schools, academies, and many literary and learned societies; a deaf and dumb institution; an academy of design, painting, and architecture; many museums; a public library of 60,000 volumes and 2000 MSS., with a cabinet of 6000 coins and medals, and admirable establishments for the poor. The chief manufactures are oil, paper, musical and optical instruments, bronzed articles, hats, leather, hardware, &c. The town has a tribunal of commerce, an exchange, savings' bank, a discount bank, and several assurance companies. There is a considerable trade in American and Russian furs; and the wool fairs, especially that held in June, are very important. Leipzig, though comparatively small, has become one of the most important cities in Europe, owing to its university, its fairs, and its book trade.

The university was founded by the Elector Frederick and his brother William, on the 4th December, 1409, which is the date of the bull of Pope Alexander VI., confirming the foundation. During its whole existence of more than four centuries, the university of Leipzig has enjoyed the reputation of being one of the most eminent in Germany. The library consists of 100,000 volumes and above 4000 MSS., and is particularly rich in works on philology, medicine, and divinity.

The origin of Leipzig was a Slavonian village that stood in the fork between the Parde and the Pleisse; this is said to have received its name from the lime-trees growing about it, which are called, in Slavonian, Lip, Lipa, or Lipsk. It is not spoken of as a fortified town till the 12th century, under Margrave Otho the Rich, who granted it a licence to hold two fairs, at Easter and Michaelmas. The first fair at New Year was proclaimed in 1458, and the three fairs were confirmed by the emperor in 1507. These fairs have laid the foundation of the prosperity and wealth of Leipzig. The concourse of merchants from various countries is very great, and the value of the manufactured goods of all kinds sold annually is estimated at upwards of three millions sterling.

The singular concentration of the German book-trade in Leipzig has been a main cause of the celebrity and wealth of that city. The first two booksellers, who were also printers, that settled in Leipzig were Steiger and Boskopf, in 1545. There are now 110 publishing establishments, and 23 great printing houses, with 14 printing machines and 260 presses. Above 40 millions of sheets are annually printed at Leipzig, and the bales of books brought thither every year amount on an average to 30,000 cwt. For the transaction of business, and settlement of accounts, there is a handsome building called the Booksellers' Exchange, which was opened in 1836.

Leipzig has suffered at different periods by the miseries of war. In September 1631, the great victory obtained by Gustavus Adolphus over Tilly was fought on its plain; and in 1642 it was besieged by the Swedish general Torstenson. The fearful conflicts of the 16th, 17th, and 18th of October, 1813, in which Napoleon was defeated by the allied armies under Prince Schwarzenberg, took place near the town; in the village of Probstheida, which was in the centre of the combat, a colossal cross has been erected to commemorate the terrible battle.

(Leonhardi's *Geschichte und Beschreibung der Kreisstadt Leipzig*, Leipzig, 1799; Dolz's *Versuch einer Geschichte von Leipzig*, Leipzig, 1818; and Gretschel, *Leipzig und seine Umgebungen*, Leipzig, 1828.)

LEITH, a seaport town and contributory parliamentary borough in Edinburghshire, is situated on the banks of the river Leith, at its confluence with the Frith of Forth, about 2 miles N.E. from the city of Edinburgh, with which it is connected by a broad street called Leith Walk. The omnibuses which pass along this fine road every few minutes, and the accommodation afforded by the Edinburgh and Leith Railway, conduct a great traffic from one town to the other. Leith is irregularly built and ill-paved, but contains many handsome houses of recent erection. There are several churches and other public buildings, of which it is sufficient to mention the custom-house, the exchange buildings, the new court-house, mariners' hospital, assembly-rooms, and the elegant bathing establishment at Seafield. The chief manufactures are ropes, cordage, sailcloth, bottles, soap, and candles. There are several breweries, ship-building yards, and a distillery.

The chief educational establishment at Leith is the High School, the funds of which, consisting of various endowments, were aided by a munificent bequest of Dr. Bell in 1831.

There are two commodious dry docks for the repairing and building of ships, and two wet docks, each of which is 300 feet wide and between 700 and 800 feet long, and of sufficient depth to admit vessels of from 200 to 250 tons' burthen. They are surrounded by well-constructed quays, upon which are erected appropriate warehouses for the reception of merchandise. The depth of water in the harbour during neap-tides is about 10 feet, and during spring-tides about 16 feet. Steamers ply to and from Leith; but the new pier at Granton is found to be more available for this kind of traffic. Leith is the most important naval station on the east coast of Scotland, and its commerce is large. The gross customs receipts in 1845 were 520,123*l.*, and in 1846, 578,598*l.*, ranking next after London, Liverpool, Dublin, Bristol, and Glasgow. The vessels which entered the Port of Leith in 1846 were—British, 332; foreign, 621. Coals shipped in 1846, 16,000 tons. Tobacco imported in 1846,

680,000 lbs. 386 boats, and 2064 persons, were engaged in the Leith and Burntisland fisheries in 1846.

The borough, in union with Portobello and Musselburgh, returns 1 member to parliament. The population of the town in 1841 was 26,433; of the parliamentary district, 35,688.

A peculiar connection exists between Edinburgh and Leith, whereby the revenues of the latter are controlled by the former, under certain stipulations fixed by act of parliament.

LEITMERITZ. [BOHEMIA.]

LEITRIM, a maritime county of the province of Connaught in Ireland, is bounded N. by the Bay of Donegal and by Donegal county, N.E. by the county of Fermanagh, E. by the county of Cavan, S.E. and S. by the county of Longford, and S.W. and W. by the counties of Roscommon and Sligo, from the former of which it is separated by the river Shannon. It lies between 53° 47′ and 54° 27′ N. lat., and between 7° 35′ and 8° 25′ W. long., and extends from N.N.W. to S.S.E. 51¼ miles, varying in breadth from 5½ miles to 21 miles. The area is 613 square miles. The population in 1841 was 155,297.

The outline of Leitrim is very irregular, being contracted in the centre to little more than the breadth of Loch Allen. The district lying S. and E. of Loch Allen is an irregular parallelogram of about 17 miles by 18. This district is to a considerable extent encumbered with narrow and steep ridges of low elevation, and there are many small lakes, of which one of the largest is Loch Rinn, about 2 miles in length by 1½ mile in width. Northward from Loch Rinn extends an open undulating plain, interspersed with numerous lakes and streams as far as the southern extremity of Loch Allen. This district forms part of the great limestone plain of Ireland, and contains some patches of excellent arable land, but is in general more adapted for grazing. The main drainage of the limestone district is S. and W. to the Shannon, but several considerable streams run E. to the lakes on the border of Cavan. Of the latter the principal is the river Dale. A cluster of lakes, of which the largest are called Lough Scur and St. John's Lough, occupies a tract of about 6 miles in length on the north of this level district, and there are upwards of fifty other lakes, varying in size from a quarter of a mile to a mile in length, scattered throughout the same portion of the county. N.W. from Loch Allen is a low tract, in which the river Bonnet flows. With this exception, the northern part of Leitrim is covered with mountain-groups, of which none of the elevations exceed 2000 feet. Loch Macnean and Loch Melvin extend along the eastern boundary of the county, separating it from Fermanagh, in which they partly lie. They are respectively 3½ and 7½ miles in length, and are pleasingly diversified with wooded islands. The Kilcoo River connects them, and their waters are discharged into the Bay of Donegal, by the Drowes. The river Duff, which separates Leitrim from Sligo, runs into the Bay of Donegal, at the eastern extremity of the coast-line. The shore is for the most part a rocky bluff, with a rough stony beach along the foot of it, and is exposed to the whole swell of the Atlantic. The Shannon is crossed by seven bridges within the limits of the county.

The climate is raw and damp, particularly in the northern parts of the county, owing to the great extent of moory ground and the vicinity of the Atlantic. In the sheltered valleys however, particularly in the vicinities of Dromahair and Manorhamilton, where there is a kindly soil, vegetation is as luxuriant as in most parts of other counties in the same latitude. The surface of Leitrim is now barer of wood than most of the neighbouring counties.

The varieties of surface in Leitrim indicate the internal structure with peculiar precision. The flat-topped mountain groups showing steep escarpments and natural terraces belong to the millstone-grit or Loch Allen coal formation. The undulating open country has the floetz-limestone for its substratum, and the rough coarse land, when not belonging to the Loch Allen basin, generally consists of sandstone, conglomerate, and wacke. The rocks of the Loch Allen coal district are more analogous to the millstone-grit of the north of England than to coal tracts in general. Alternations of shale and sandstone containing beds of coal appear wherever the mountains are of sufficient altitude; for it would seem that such a formation had originally extended over the entire district, and that the absence of those members from the lower mountains has been owing to their removal by some abrading and denuding force. At present they remain only on the summits of Sliev-an-ieran, Lugnaculleagh, Lackagh, and on the highest part of the Munterkenny range; and the occurrence of coal in lumps throughout the sandstone, gravel, and blue-clay hills of the south and south-eastern parts of the county confirms the supposition that a portion of the coal formation has been removed. The chief workable beds of the district are situated on the summit of the Braulieve Mountains, on the southern side of the valley of the Arigna, where the coal-measures have been worked for the purpose of smelting the ironstone with which they are associated. Where the millstone-grit formation terminates, the floetz-limestone reappears and occupies the greater portion of the district watered by the Bonnet and its tributaries. The only primary rock within the county is along the western boundary of the valley of the Lower Bonnet, where the granitic and trap formation occurs.

The soil of Leitrim is far from kindly even in the open limestone country, being for the most part stiff, cold, and very retentive of wet. The best tracts are along the Shannon, the Rinn, and the Bonnet. The principal crops are potatoes, oats, and flax. Wheat is not grown to any considerable extent. Improved implements of husbandry are scarcely in use among any but the gentlemen farmers. Leitrim is more a grazing than an agricultural county. Large quantities of young stock, chiefly horned cattle, are raised on the pasturable plains of the southern district.

The spinning and weaving of linens is the on

branch of manufacture carried on with activity. There are three or four bleach-greens in the county.

Divisions and Towns.—Leitrim is divided into 5 baronies. It is in the dioceses of Kilmore and Ardagh. It is in the Connaught Circuit, and the assizes are held at Carrick-on-Shannon. The county returns 2 members to parliament.

Carrick-on-Shannon, is the chief town in Leitrim, is 98 miles N.W. from Dublin by the road. It is situated on the west bank of the Shannon, and contains a good court-house, county gaol, church, and Roman Catholic chapel. A small part of the town is in Roscommon, on the opposite bank of the river. Population in Leitrim, 1716; in Roscommon, 268. *Leitrim* is a poor village 3 miles N. from Carrick-on-Shannon. *Manorhamilton* is a small town, about 28 miles N. from Carrick-on-Shannon, situated in a beautiful part of the county, and watered by the Owenmore, a fine mountain-stream, which falls into the Bonnet a little below the town. Population, 1507. *Mohill*, a small town, about 10 miles S.E. from Carrick-on-Shannon, has a population of 1626.

History and Antiquities.—Before the coming of the English, Leitrim formed a portion of the territory of Breifne, of which O'Rourk was petty king, and was called Breifne or Brenny O'Rourk, to distinguish it from Brenny O'Reily, the present county of Cavan. The whole of Brenny O'Rourk is said to have been bestowed by King John on De Lacey; the O'Rourks nevertheless continued to maintain their independence until the reign of Elizabeth, when Leitrim was first reduced to shire ground as a separate county in 1563. There were many disturbances in the county subsequently, which were not settled till 1615, when the king's title to the greater part of Leitrim was confirmed, and numerous patents were granted to undertakers by a commission appointed for the purpose of disposing of the estates of the crown in Leitrim, Longford, and King's County. Again however, on the breaking out of the rebellion of 1641, the native Irish, headed by Sir Owen O'Rourk, seized all the places of strength in the county, with one or two exceptions. The confiscations which followed on the termination of these wars in 1650 included almost all the lands that had been allowed to remain to the native proprietors under former attainders, and may be said to have extinguished the family of O'Rourk.

The remains of antiquity in Leitrim are not very interesting. There are some ruins of the abbey of Fenagh, celebrated during the early period of Irish church history as a school of divinity. The abbey of Creevlea, near Dromahair, founded by the wife of Owen O'Rourk in 1508, was an extensive pile, of which the principal walls are still standing. The remains of the other religious houses are insignificant. O'Rourk's Hall at Dromahair, Castle Longfield, Cloncarrick Castle, Castle Car, and several others now in ruins, belonged to the O'Rourks. The strongest and handsomest fortalice however in the county is the castle of Manorhamilton, built about 1628 by Sir Frederic Hamilton. It is quoined and corniced with cut stone, and is surrounded by a regular rampart with four bastions.

LELAND, JOHN, D.D., born 1691, died 1766, was of a Presbyterian family in Lancashire. Early in life he became pastor of a congregation of Presbyterian Dissenters in Dublin, and in that situation he spent the remainder of his days. All his works are esteemed valuable defences of Christianity; but his chief work is entitled 'A View of the principal Deistical Writers that have appeared in England in the last and present Century; with Observations upon them.' It appeared in 1754.

LELAND, THOMAS, born 1722, died 1785, a divine, scholar, and historical writer, was a native of Dublin. His principal works are, 'A Translation of Demosthenes,' 1756–1770; 'A History of the Life and Reign of Philip of Macedon,' 1758; and 'A History of Ireland,' 1773.

LE'LEGES. The Leleges appear, from numerous traditions, to have inhabited the islands of the Ægean Sea and the western coasts of Asia Minor from a very early period. In Homer they are represented as the allies of the Trojans. Strabo informs us that they once inhabited, together with the Carians, the whole of Ionia. But in the numerous traditions respecting them in the north of Greece we find no connection between them and the Carians. According to Aristotle, they inhabited parts of Acarnania, Ætolia, Opuntian Locris, Leucas, and Bœotia.

LELY, SIR PETER (or Peter Vander Faes), was born in 1617, at Soest in Westphalia. He studied under Peter Grebber at Haarlem. He afterwards came to England, and was appointed state-painter to King Charles II. He occasionally painted historical pictures, one of the best of which is a representation of Susannah and the Elders, at Burleigh House. His most celebrated performance is the series of portraits of the beauties of the Court of King Charles II., preserved at Hampton Court. Lely equally excelled as a crayon painter. He died in England in 1680.

LEMAN LAKE, *Lemánus Lacus, Lake of Geneva, Genfersee*, extends in the form of a crescent from east to west between Switzerland and Savoy. Its northern or convex bank, which forms an arc of about 53 miles in length, not reckoning the sinuosities, belongs to the Swiss canton of Vaud; and the southern or concave side, forming an arc of 46 miles, belongs for the greater part to Savoy, the canton of Geneva possessing about 8 miles of it at the south-western, and the canton of Valais 4 miles of it at the south-eastern extremity. Its breadth varies greatly, being about 9 miles in the middle, 4 towards the eastern extremity, 3 in its western part opposite Nyon, and one mile just before reaching Geneva. This narrow part, which is about 14 miles in length from Nyon to Geneva, is called the Little Lake, and more especially the Lake of Geneva. The greatest depth of the Leman, below the cliffs of Meillerie on the coast of Savoy, is nearly 1000 feet; it is 500 feet deep near the castle of Chillon, on the opposite coast, and from 600 to 300 feet in other places. The lake seldom, if ever, freezes; the temperature of its water below 150 feet depth is 41° of Fahrenheit. Its surface is 1150 feet above the sea, but in summer it rises sometimes from six to eight feet higher,

owing to the melting of the snows in the Alps. The water reflects a bright azure tinge like that of the Mediterranean Sea. The Rhone, coming from the Valais, enters the lake at its south-east extremity, where the waters of the river are muddy coloured; and it issues out of it again at Geneva at the south-west extremity, where its waters assume a deep blue tinge. Steam-boats ply regularly between several points on the shores of the lake, the scenery around which has been always a subject of admiration to travellers. (Leresche, *Dictionnaire Géographique de la Suisse.*)

LEMBERG. [GALIZIA.]

LEMBERG (*Leopol*), the capital of the kingdom of Galizia, lies in 49° 52′ N. lat., 24° 2′ E. long., and has a population of about 60,000, 20,000 of whom are Jews. It is situated in a narrow valley, on a small stream called the Peltew, which is dry in summer. The town has greatly improved since it came into the possession of Austria. It contains many handsome buildings, broad straight streets, and lofty houses built of freestone, which, with the cupolas and steeples of the cathedrals and churches, give it an air of grandeur. In 1704 Charles XII. of Sweden took it by storm. The fortifications have been pulled down, and low ramparts erected, which are planted with trees and laid out in public walks. There are in Lemberg—a handsome cathedral and 13 other Roman Catholic churches, an Armenian and a Greek cathedral, a Lutheran chapel, 2 synagogues, and 9 convents. Besides being the residence of the Governor-General, and all the chief military and civil authorities of the kingdom, Lemberg has a university, 2 gymnasia, 2 theological seminaries, and numerous charitable institutions. The manufactures of woollen cloth and linen are important. Lemberg has an important commerce with Russia and Turkey. The commission trade is very extensive; and an immense amount of business is done at the annual fair; it commences on Jan. 6, and for some weeks afterwards a vast concourse of strangers resort to this place.

LEMGO. [LIPPE.]

LEMMA (λῆμμα, literally 'a thing taken or assumed'), a preparatory proposition borrowed from another subject, or from another part of the same subject, and introduced at the point at which it becomes indispensable.

LEMMING. [MURIDÆ.]

LEMNIAN EARTH is an earthy substance, soft, dull, opaque, yellowish white, and falls to pieces when put into water. It was formerly used in medicine under the name of *Terra Sigillata*. Two-thirds of its weight consist of silica.

LEMNISCA'TA, a curve (first noticed by James Bernoulli) having the form of an 8, but with the upper and lower parts perfectly symmetrical.

LEMNOS, one of the northern islands of the Ægean Sea, situated nearly half way between Mount Athos and the entrance of the Dardanelles, and about 22 miles south-west of Imbros. Its area is about 17 square miles, and its population 8000, all Greeks, with the exception of the Turkish garrison and governor. The modern Greeks call both the island and the town Stalimene. The surface is hilly; the western part of the island, which is more fertile than the eastern, produces wine and corn, hemp and flax, and fruits, but it is deficient in timber trees and in wood for fuel. The principal harbour, called Sant Antonio, in the south-west part of the island, is large and safe.

Lemnos is known, in ancient mythology, as the spot on which Vulcan fell after being hurled down from heaven. The Athenians, led by Miltiades, took Lemnos after their conquest of the Chersonesus. (Herod., vi. 140.) Lemnos had two towns, Hephæstiæa and Myrina. The present castle is supposed to be on the site of the latter.

LEMOINE, FRANÇOIS, was born at Paris in 1688. He was the pupil of Louis Galloche, and in 1718 he was elected a member of the Royal Academy of Painting. He obtained a great reputation by his painting in oil of the Transfiguration of Christ on the ceiling of the choir of the church des Jacobins, Rue du Bacq, Paris. In 1724 Lemoine visited Italy, where he remained for a year. After his return to France he was made professor of painting in the Academy, and Louis XV. appointed him in 1736 his principal painter, with a salary of 4100 francs. The first of Lemoine's great works was the cupola of the chapel of the Virgin in St. Sulpice, in fresco, which he commenced in 1729, a work of three years' labour. His masterpiece however is the Apotheosis of Hercules, painted in oil on canvas pasted on the ceiling of the Salon d'Hercule at Versailles.

After the completion of this great work he was without a rival in France, but he never enjoyed his success. He was naturally of a melancholy temperament, a weakness which the loss of his wife and his constant and intense application aggravated to such a degree that it amounted to a chronic aberration of intellect, and he destroyed himself in one of these nervous fits, June 4, 1737, ten months after the termination of his great work at Versailles, and in the 50th year of his age.

LEMON. [CITRUS.]

LEMON ACID. [CITRUS AURANTIUM.]

LEMU'RIDÆ, the family of Lemurs (*Les Makis* of the French), constituting the last great group of the *Quadrumana*, in Cuvier's 'Règne Animal.'

The characters distinguishing the Lemurs from the Monkeys were founded by Linnæus upon the number of the incisor teeth; but, as these characters are negative, their application in a strict sense is impossible. The Lemuridæ resemble the monkeys of the old world in having opposable thumbs on the fore hands as well as on the hinder pair; and indeed the thumb of the hinder hands is large, and greatly expanded at the tip. In some species the index finger of the fore hands is abbreviated, and the index finger of the hinder pair is armed with a long, subulate, slightly curved claw (in the Tarsier the next also); the other nails are flat. Tail variable. Fur woolly. The molar teeth are tuberculous, the tubercles and depressions of the opposing teeth mutually fitting into each other. Habits arboreal and nocturnal.

Several genera are comprehended under the Lemurine Family. Of these the chief are:—

1. *Propithecus* (Bennet). Locality, Madagascar. ('Proc. Zool. Soc.,' 1832, p. 20.)
2. *Lemur*. Locality, Madagascar.
3. *Lichanotus* (*Indris*). Locality, Madagascar.
4. *Stenops* (*Loris* and *Nycticebus*, Geoff.). Locality, India, Ceylon, Java, Sumatra.
5. *Otolicnus* (*Galago*). Locality, Africa.
6. *Cheirogaleus*. Locality, Madagascar.
7. *Microcebus*, or Mouse Lemurs. Locality, Madagascar.
8. *Perodictus* (Bennet). Locality, Sierra Leone. ('Proc. Zool. Soc.,' 1830, p. 109.)
9. *Tarsius*. Locality, Sumatra.

To these we may add two abnormal genera, viz.—

10. *Cheiromys*. Locality, Madagascar.
11. *Galeopithecus* (Flying Lemurs). Locality, Moluccas. ('Zool. Trans.,' vol. ii.)

The genus *Lemur* may be thus described. Head long, muzzle pointed; eyes moderate and oblique; tail long and bushy; mammæ two, pectoral: all are natives of Madagascar; arboreal, nocturnal. Their movements are light, sweeping, elegant, and precise. They repose wrapped up in the form of a ball, with the bushy tail twined around them. Their usual voice is a low inward grunt, but they often break forth into an abrupt hoarse roar.

$$\text{Incisors, } \frac{4}{4}\text{; Canines, } \frac{1—1}{1—1}\text{; Molars, } \frac{6—6}{6—6}.$$

The first false molar below is stout, and resembles a canine, whence has arisen the idea that it is really a canine, whereas the true canines of the lower jaw are in close contact with the incisors, and like them are obliquely directed. As examples of this genus we may notice the White-Fronted Lemur (*Lemur albifrons*), the Ruffed

White-Fronted Lemur (*Lemur albifrons*).

Lemur (*L. Macaco*), the Mongooz Lemur (*L. Mongos*). These animals are easily tamed, very gentle, and remarkable for their address and agility.

LENA, River. [Siberia.]

L'ENCLOS, NINON DE, was born in 1616, of a noble family of Touraine. Being remarkably handsome and graceful, she was courted by most of the noblemen and wits about court. She retained her attractions to a very advanced age. Some of her letters to St. Evremond, among the works of that author, and in the 'Lettres de Femmes Célèbres,' edited by L. Collin, 1805, are the only authentic memorials of her pen. She died in Paris in 1706.

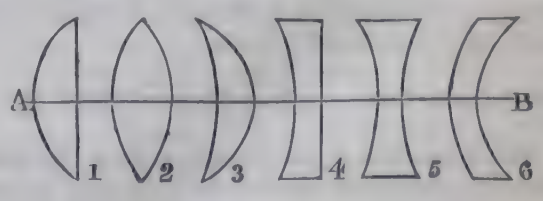
LENFANT, JACQUES, was born at Bazoche in Beaure, a district of the ancient province of Orléannois in France, April 13, 1661, and was the son of Paul Lenfant, the Protestant minister of Châtillon-sur-Seine. He completed his theological education at Geneva and Heidelberg, in which latter town he was admitted into the ministry of the Protestant church during the month of August 1684. He obtained the appointment of minister of the French church at Heidelberg, and of chaplain to the Dowager Electress Palatine. The invasion of the Palatinate by the French troops, under Marshal Turenne, compelled Lenfant to leave Heidelberg in 1688, and he settled at Berlin. The elector of Brandenberg, Frederick, afterwards king of Prussia, appointed him to the French Protestant church in that city, where for upwards of thirty-nine years he performed duty. In 1707 he visited England. In 1710 he obtained the situation of chaplain to the King of Prussia, and councillor of the high consistory. Lenfant was suddenly attacked with paralysis, and died Aug. 7, 1728.

In 1718, in conjunction with Beausobre, he published a translation of the New Testament, with explanatory notes. He wrote many other works on theological subjects, but it is by this work that he is most known in England.

LENNEP. [Düsseldorf.]

LENNEP, JOHN DANIEL VAN, was born at Leeuwarden, in Friesland, Holland, in November 1724, and was educated at the university of Franeker. He was elected in 1752 professor of Latin and Greek at Groningen, and, after remaining there fifteen years, was appointed to a similar professorship at Franeker. He died Feb. 6, 1771. Lennep is principally known by his 'Etymologicum Linguæ Græcæ,' which was published after his death by his pupil Scheide, 2 vols. 8vo., Utrecht, 1790; a book which used to be considered a standard authority on Greek etymology, but is in fact nothing more than a mass of absurdity.

LENS (Latin for 'a small bean'), a name given to a glass, or other transparent medium, ground with two spherical surfaces in such manner as to be generated by the revolution of one or other of the following figures about the axis AB.



1 is plano-convex; 2 is double-convex; when the radii are equal, it is called equi-convex; and when one radius is 6 times the other it is called a crossed lens; 3 is a meniscus; in every such lens the concave side has the larger radius; 4 is

plano-concave; 5 is double concave; 6 is concavo-convex.

Let the following figure represent the passage of a ray PQ of light, parallel to the axis MF, through a lens QM: then, a number of such rays constituting a cylindrical surface about the same axis will, after refraction, converge to a certain point as F; and at a greater distance from the axis a like cylinder of parallel rays will converge to a different point, as A, nearer the lens. If the former cylinder be very near the axis MF, F is considered as the *focus* of the lens; AF is called the longitudinal aberration of a ray PQ, and FB its latitudinal aberration.

We shall merely state here the principal formulæ for determining the focal length MF of a lens. The investigations will be found in any good treatise on Optics (see Coddington's 'Treatise on the Reflexion and Refraction of Light,' Cambridge, 1829).

Let μ be the index of refraction, or $\mu : 1$ the constant proportion which the sine of the angle of incidence bears to that of refraction (which for plate-glass varies from 1.500 to 1.540; for crown glass from 1.525 to 1.563; and for flint glass from 1.576 to 1.642); and let r and s be the radii of the two sides of the lens, the former being the radius of the surface on which the light is incident, and the latter that of the surface from which the light emerges after refraction. Also let every convex surface be considered as having a positive radius, and every concave surface a negative one. Let f be the focal distance, it being agreed that the focal distance shall be positive when parallel rays are made to converge, and negative when they are made to diverge, that is, to proceed as if they came from a point on the same side of the glass as that on which they entered. One formula, upon these suppositions, will embrace all the cases; and that formula is

$$\frac{1}{f} = (\mu - 1)\left(\frac{1}{r} + \frac{1}{s}\right)$$

on the supposition that the central thickness of the lens is inconsiderable. But, if it be necessary to take this thickness into account, let it be called t, and let r be the radius of the side at which the light enters: then find f from

$$\frac{1}{f} = (\mu - 1)\left(\frac{1}{r} + \frac{1}{s}\right) + \frac{(\mu-1)^2}{\mu} \cdot \frac{t}{r^2}.$$

The focal distance, as determined from the first formula, is the same whether the light enter on one side or the other; but the correction for the thickness depends, as we see, upon the side at which it enters.

In applying these formulæ to the several cases, the proper signs must be given, as above said, to r and s, and each of these radii is to be considered as infinite when the surface is plane. Thus, for the lens represented at 1, the first formula gives

$$f = \frac{s}{\mu - 1},$$

and for the lens at 4,

$$f = -\frac{s}{\mu - 1};$$

again, for the lens at 2,

$$f = \frac{rs}{(\mu - 1)(s + r)},$$

and the same fraction, with a negative sign prefixed, is the value of f for the lens at 5.

To express the longitudinal aberration AF, in the case of a pencil of parallel rays, supposing the material to be glass, in which μ may be considered as equal to $\frac{3}{2}$:

Let MN be represented by y, and $\frac{s-r}{s+r}$ by x;

then $\mathrm{AF} = -\frac{(7x^2 - 10x + 10)y^2}{6f}$;

from which it appears that the longitudinal aberration varies directly as the square of the diameter of the lens; and inversely as the focal distance.

The aberration is least for a given aperture and focal length when $x = \frac{5}{7}$, which gives $s = 6r$, requiring a double-convex or double-concave lens, in which the radius of the side on which light enters is one-sixth of the other. The convex lens of this kind is what opticians call the crossed lens.

The latitudinal aberration FB is,

$$\text{for glass } \frac{7x^2 - 10x + 10}{6} \cdot \frac{y^3}{f^2}.$$

If we observe the rays in the second figure (and the same may be clearly seen in a beam of sunlight thrown into an otherwise dark room through a convex lens), we shall see that the luminous space is bounded by a surface of revolution which narrows and afterwards spreads again, as in this

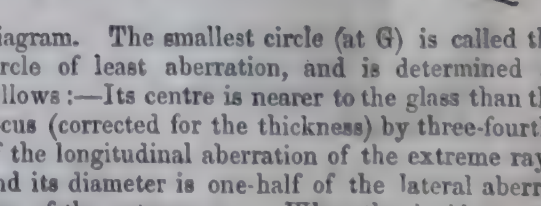


diagram. The smallest circle (at G) is called the circle of least aberration, and is determined as follows:—Its centre is nearer to the glass than the focus (corrected for the thickness) by three-fourths of the longitudinal aberration of the extreme ray, and its diameter is one-half of the lateral aberration of the extreme ray. When the incident rays in a pencil are not parallel, but proceed from a point in the axis, on the right or left hand of M at a distance, from the lens, represented by U; then, if V be the distance of the focus of parallel rays proceeding in the opposite direction and falling on the surface whose radius is s, U being negative when the entering pencil is divergent, and V negative when the emergent pencil is convergent. Let f be the distance of the uncorrected focus o

parallel rays from the surface of emergence, determined as before. Then, if the thickness of the lens be inconsiderable, V is determined from U by the equation

$$\frac{1}{V} + \frac{1}{U} = \frac{1}{f} = (\mu - 1)\left(\frac{1}{r} + \frac{1}{s}\right).$$

When two or more lenses are placed close together, in finding the approximate focal distance, uncorrected for the thicknesses, they may be considered as one lens, whose focal distance has a reciprocal equal to the sum of the reciprocals of the focal distances of the component lenses.

LENS, CRYSTALLINE. [EYE.]

LENT (in Latin, *Quadragesima*), a time of mortification, commemorative of the miraculous fasting of our Saviour in the desert; used as a preparation for Easter. The Saxon term was *Lencten*, implying Spring, the season when the day increases in *length*, about the commencement of which this fast usually falls: it is, in fact, the Spring-Fast. In the ancient Latin church Lent consisted only of thirty-six days: the four additional days began in the ninth century.

LENTIBULA'CEÆ, a small monopetalous order of exogenous plants, resembling *Scrophulariaceæ*. *Pinguicula* and *Utricularia* are the only genera of this order.

LENTIL. [VICIEÆ.]

LENZINITE, an earthy, soft, whitish, translucent mineral, consisting of silica, alumina, and water. When put into water, it divides into numerous small translucent bits, which, when touched, fall into grains of great hardness.

LEO I., Emperor of Constantinople, born in Thrace of obscure parents, entered the military service, and rose to high rank. At the death of the Emperor Marcianus, A.D. 457, he commanded a body of troops near Selymbria, and was proclaimed emperor by the soldiers. Leo followed the measures of Marcianus against the Eutychians. Leo, in concert with Anthemius, emperor of the West, prepared a numerous fleet for the recovery of Africa, which was occupied by the Vandals. The expedition however was defeated. Leo died in Jan. 474, bequeathing the throne to his grandson Leo, the child of Zeno, the captain of his guards, and Ariadne, Leo's daughter.

LEO II. was four years of age when he was proclaimed. Ariadne and her mother the empress Verina, having determined to place Zeno on the throne, induced the child one day, while in public, to place a crown on his father's head and call him his colleague. Young Leo died after a nominal reign of ten months, and Zeno was suspected of having procured the death of his child.

LEO III., called Isauricus from the country of his birth, was of humble parentage, and served in the army under Justinian II. Under the reign of Anastasius II. he received the supreme command of the troops of Asia. Anastasius was deposed, but Leo would not acknowledge Theodosius III., who was proclaimed in 716, and marched to Constantinople, when Theodosius resigned the crown to Leo in 717. He defeated the Saracens, who had laid siege to Constantinople; and in 719 Anastasius, who had attempted to resume the crown, was beheaded. It was in this reign that the schism of the Iconoclasts, or Image-Breakers commenced, by an edict of Leo ordering the immediate removal of all images from churches. This led to great disorders, and in the midst of an unsuccessful struggle both against the Saracens of Asia and against the Italians and the Pope, Leo died of the dropsy in the year 741, and was succeeded by his son Constantine.

LEO IV., son of Constantine Copronymus, born at Constantinople in 751, succeeded his father in 775. He adopted the Iconoclastic tenets with blind fanaticism, banished his own wife Irene on this account, and persecuted others. He died in 780, and was succeeded by his son Constantine VI.

LEO V., called the Armenian, held a command in the army in the reign of Nicephorus. He was elevated to the throne A.D. 813, the reigning Emperor Michael Rangaubi retiring into a convent. The most noticeable events of his reign were the persecution of the Iconoclasts, the defeat of the Bulgarians, the banishment of the Patriarch Nicephorus, and a succession of conspiracies, to one of which, headed by Michael the Stammerer, a patrician and former adherent of Leo, the emperor fell a victim. He was stabbed A.D. 820. Michael the Stammerer succeeded him.

LEO VI., styled the Philosopher, was the son of the emperor Basilius the Macedonian, whom he succeeded in 886. His brother Alexander was his nominal colleague, but left the government entirely to Leo. The reign of Leo, which lasted 25 years, was not prosperous; for, while the armies were beaten both by the Saracens and Bulgarians, the capital and the palace were disturbed by the intrigues and excesses of the courtiers, and by the emperor's own irregularities. Leo completed and published the 'Basilica,' or Greek compilation of the laws of the empire, undertaken by his father. He wrote also a treatise on Tactics, which has been published by Meursius; and a collection of Oracles or Prophecies, which has also been published.

LEO I. was only a deacon when he was chosen by the clergy and the people of Rome to be their bishop, after the death of Sixtus III., A.D. 440, under the reign of Valentinianus III., emperor of the West, and Theodosius II., emperor of the East. Soon after his exaltation he had a controversy with Hilarius, bishop of Arelate, and obtained a rescript from the Emperor Valentinian III. suspending Hilarius from his episcopal office. Leo also induced the emperor to issue, in the year 445, several laws against the Manichæans and other heretics. He assembled a council at Rome in 449, in which he annulled the acts of the council of Ephesus, which had absolved Eutyches. [EUTYCHIANS.] Soon afterwards the Œcumenic council of Chalcedon, A.D. 451, condemned the doctrine of Eutyches, and defined the doctrine concerning the person of Christ. Leo died in 461, and was succeeded by Hilarius I. His writings, especially his Sermons and his Epistles, are useful for the history of the times. Cave has given a full account of his life, as well as Maimbourg, 'Histoire

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du Pontificat de St. Léon le Grand.' Father Cacciari published an edition of Leo's works, 3 vols. fol., Rome, 1751–5. Leo's Sermons have been translated into French by the Abbé de Bellegarde, Paris, 1701. The Roman Church numbers him among its saints, and gives him the epithet of Magnus, or 'St. Leo the Great.'

LEO II. [Pope.]

LEO III., a native of Rome, was elected after the death of Adrian I., A.D. 795. The principal event of his pontificate was an attempt made upon his life by a band of armed ruffians (for which the two chief conspirators, Paschal and Campulus, were exiled), and an examination into certain charges brought against him by his enemies, but which they failed in establishing. Leo crowned Charlemagne, who from that time styled himself Augustus, and Emperor of the Romans. Leo died in 816, and was succeeded by Stephen IV.

LEO IV., V., VI., VII., VIII., IX. [Pope.]

LEO X., *Giovanni de' Medici*, the second son of Lorenzo the Magnificent, was born in December 1475. After experiencing some reverses of fortune he was elected pope, in March 1513. He sent a general amnesty to be published at Florence, where a conspiracy had been discovered against the Medici. He appointed his nephew Lorenzo governor of Florence, which continued during the rest of Leo's life to be a dependency of Rome.

Leo found the war renewed in Northern Italy. The French were defeated at Novara, and driven from that country; they then formed an alliance with the Venetians, which Leo endeavoured to break off.

Leo reopened the council of the Lateran, which Louis XII. acknowledged. That monarch died in the following year, and his successor, Francis I., among his other titles, assumed that of Duke of Milan, which was the signal for a new Italian war.

The French took possession of Milan, and the contending parties subsequently came to terms. A concordat was agreed upon regulating the appointment to the sees and livings in the French kingdom, which remained in force till the revolution of 1789. A marriage was also agreed upon between Lorenzo, the pope's nephew, and Madeleine de Boulogne, niece of Francis de Bourbon, duke of Vendôme.

In 1516, Leo, under some frivolous pretences, deprived Della Rovere, the nephew of Julius II., of his duchy of Urbino, Pesaro, and Sinigaglia, which he gave to his nephew Lorenzo de' Medici. Soon afterwards a conspiracy to murder the Pope was discovered at Rome, and cardinal Petrucci, who was at the head of it, was hanged. In 1517 the council of the Lateran was finally closed, and in the same year Leo authorised the sale of indulgences in Germany, which was the immediate cause of the Reformation. [Luther.]

In 1518 a league of five years was proclaimed by Leo among the Christian princes, to oppose the advance of the Turks, who were threatening Italy.

The alliance of Leo with Francis I. was a hollow one, and the former concluded a secret treaty, offensive and defensive, with Charles V., July 8, 1521, by which it was stipulated that the duchy of Milan was to be taken from the French and given to Francesco Maria Sforza, and Parma and Piacenza to be restored to the Pope. These changes were soon effected; but, in the midst of the public rejoicings thereupon, Leo fell ill, and died December 1, 1521.

LEO XI., XII. [Pope.]

LEO, JOHN, was a Moor of Granada, who, retiring into Africa in 1492, received the surname of Africanus. He travelled a considerable time in Europe, Asia, and Africa, and subsequently abjured the Mohammedan religion under Pope Leo X. He is believed to have died about 1526. His 'Description of Africa' was first written in Arabic, and afterwards translated by its author into Italian. There have been several translations of it since. Leo wrote also the 'Lives of the Arabian Philosophers,' printed by Hottinger, in Latin, at Zürich, fol., 1664; and from a different manuscript, in the 13th volume of Fabricius's 'Bibliotheca.'

LEO, LEONARDO, was born at Naples in 1694, and received a musical education under Alessandro Scarlatti. He distinguished himself by his Italian operas. But, had he not dedicated a portion of his time to the church, his name would now have been utterly forgotten. His 'Dixit,' 'Dominus,' his 'Miserere,' masses, and other sacred music, will always be esteemed. He will be remembered too as the master of Piccini, Jomelli, and other able composers. He died at Naples in 1755.

LEO, ALLATIUS. [Allatius.]

LEO (the Lion), a constellation of the Zodiac, which commemorates the Nemæan lion killed by Hercules in the mythology of the Greeks. It is surrounded by Ursa Major, Leo Minor, Cancer, Hydra, Sextans, Virgo, and Coma Berenices. A line drawn through the pole star and the lowest of the four in the Great Bear (or γ) passes through Deneb (or β Leonis); and a line drawn through the bright star Regulus (or α Leonis) of the first magnitude and Deneb passes nearly through Arcturus.

LEO MINOR, a constellation of Hevelius, surrounded by Ursa Major, Lynx, Cancer, and Leo.

LEOMINSTER. [Herefordshire.]

LEO'N, the name of a kingdom in Spain, which grew out of the conquests of the Christians from the Moors. The immediate successors of Pelayo were kings of Asturias, and resided at Oviedo. Alfonso, the Catholic, A.D. 739 to 757, conquered the towns of Leon, Astorga, Simancas, Zamora, Salamanca, and Ledesma, as well as part of Galicia, all of which were added to the dominions of the Asturian kings. Garcia, son and successor of Alfonso III., about A.D. 910, transferred the seat of sovereignty from Oviedo to Leon. Henceforth the Christian kingdom in Northern Spain was called the Kingdom of Leon and Asturias. The male line of the kings of Leon became extinct with Bermudo III. in the year 1037. His sister had married Fernando, king of Castile, who thus united both crowns. But, upon Fernando's death, Sancho, one of his sons, had Castile, and Alfonso had Leon and Asturias. The two kingdoms remained distinct,

although their crowns were sometimes worn by the same person, for nearly two centuries, until Fernando III., in 1230, permanently united the two kingdoms, assuming the title of king of Leon and Castilla, which his successors retained.

The territory of the kingdom of Leon is comprised in the basin of the Duero, between the Asturian mountains on the north, the Sierra de Gata and Sierra de Gredos on the south, which divide the basin of the Duero from that of the Tagus, Old Castile on the east, and the frontiers of Portugal and Galicia on the west. It is now divided into 6 provinces; LEON; PALENCIA; TORO; SALAMANCA; VALLADOLID; and ZAMORA. The area is 19,974 square miles, and its population in 1833 was close upon one million.

LEON, THE PROVINCE OF, is bounded N. by the Asturias, S. by Zamora, E. by Palencia, and W. by Galicia. It is 130 miles in length from E. to W., and about 50 wide from N. to S. The area is 5869 square miles, and the population in 1833 was 267,438. The province belongs mainly to the basin of the Duero, being crossed from N. to S. by the Esla, which rises in the mountains of Valdeburon, on the borders of Asturias, and flows southwards into the province of Zamora, where it enters the Duero. There is a small part of the province of Leon, west of Astorga, which belongs to the basin of the Miño, being watered by the Sil, a tributary of that river. The surface of Leon is mountainous in the north of the province, where it rises towards the Asturian chain, but it slopes to the south, where it sinks into the plain of the Duero. The country produces corn, fruit, vegetables, hemp, flax, and wine. Large herds of cattle and flocks of sheep, as well as horses and mules, are reared in this province. The manufactures are unimportant.

Leon, the capital, an old and somewhat decayed city, is said to have been built by the Roman soldiers of the 7th legion, in the time of Vespasian; it was for more than two centuries the residence of the kings of Christian Spain. Its cathedral, built in the 13th century, is one of the finest in Spain, and contains the tombs of the old kings. There are two other collegiate churches, San-Marco and San-Ysidro. The Plaza Mayor, or principal square, is handsome, and there are other squares adorned with fountains. Leon contains about 6000 inhabitants. [ASTORGA.]

LEONARD, ST. [VIENNE, HAUTE.]

LEONARDO of PISA, or LEONARDO BONACCI, an Italian mathematician who lived at the commencement of the 13th century, was the first person who brought to Europe the knowledge of algebra. His work was never printed, but is preserved at Rome, and is described in Cossali's 'History of Algebra.' He was author of a treatise preserved in the Magliabecchi library at Florence, entitled 'Practica Geographia.'

LEO'NIDAS, king of Sparta, commanded the Grecian troops sent to maintain the pass of Thermópylæ against the invading army of the Persians under Xerxes, B.C. 480. The force under his command amounted to 4200 men, besides the Opuntian Locri and a thousand Phocians. With these, during two days' fight, he defended the narrow defile which was the usual passage from Thessaly to the southern parts of Greece. But some renegades discovered a circuitous and unfrequented pass by which a body of the invaders crossed Mount Œta. On receiving intelligence that his position was thus turned, Leonidas dismissed all his soldiers except 300 Spartans; the Thebans, whose fidelity to the common cause was suspected; and the Thespians, 700 in number, who resolved to share the fate and the glory of the Spartans,—for the laws of Sparta forbade her citizens to turn their backs upon any odds. Being surrounded and attacked in front and rear, the Spartans and Thespians fell to a man after making vast slaughter: the Thebans asked and received quarter. The corpse of Leonidas was mutilated, and exposed on a cross by Xerxes. A stone lion was afterwards raised on the spot where he fell. The slain were buried where they fell, and their memory was honoured by monumental pillars. Two of the inscriptions ran thus:—'Here four thousand men from Peloponnesus once fought three millions.' 'Stranger, tell the Lacedæmonians that we lie here, obeying their laws.'

This is the account of Herodotus (vii. 202, &c.). Diodorus and Plutarch tell the story somewhat differently.

LEONINE VERSES, a kind of measure much in fashion during the middle ages. It consists properly of the Latin hexameter, or hexameter and pentameter rhymed. The most common structure of the verse is that in which the cæsura on the fifth syllable rhymes with the end of the line: as,

'En Rex Edvardus, debacchans ut Leopardus.'

There is an example of a modern attempt at Leonine verses in Parnell's translation of a passage in the 'Rape of the Lock,' beginning,

'Et nunc dilectum speculum pro more retectum.'

The classical metre is not essential. We find in the ancient hymns of the Roman Catholic Church the rhythm of modern versification; and in the famous song of Walter de Mapes, archdeacon of Oxford in the time of Henry II.:

'Mihi est propositum in taberna mori,
Vinum sit appositum morientis ori,
Ut dicant, cum venerint Angelorum chori,
Deus sit propitius huic potatori.'

LEO'NTODON TARA'XACUM (*Dandelion*), a perennial herbaceous plant of frequent occurrence. The root, leaves, and flower-stem (scape) contain much milky juice; but the root only is employed in medicine. The leaves by blanching can be rendered fit for use as a salad, as they then retain only a moderate degree of bitterness.

LEONU'RUS (from λέων, 'a lion,' and οὐρά, 'a tail'), a genus of plants belonging to the natural order *Labiatæ*. *L. cardiaca*, Motherwort, is a bitter herb with a pungent unpleasant smell. It is found in hedges and waste places in Great Britain, all over Europe, and in the middle of Asia. There are eight species of *Leonurus* described by botanists as growing chiefly in Europe and in the north of Asia. None of them are very

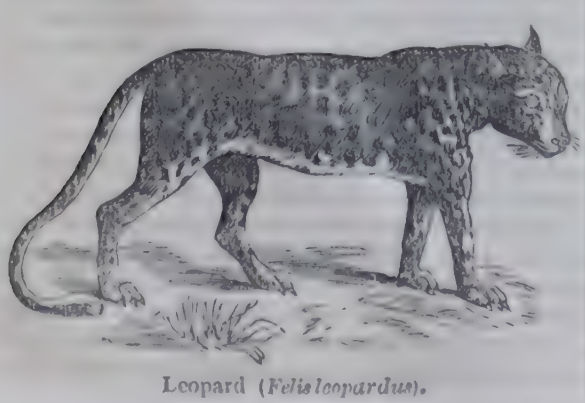
ornamental, and, being biennial plants, the seeds only require to be sown in the open ground.

LEOPARD'S BANE. [ARNICA.]

LEOPARDS, a name by which the greater spotted feline animals are popularly known. These animals, though less in size than the lion and tiger, are larger than the lynxes and tiger-cats; they are very formidable, active, and daring, and ascend trees with the utmost facility. The group is principally confined to the old world, one species only being American.

1. The Panther and Leopard (*Felis Pardus* and *Felis Leopardus*).—We have had opportunities more than most persons of seeing feline animals in a state of captivity; but we know not what positive distinctions there are between the panther and leopard. In both we observe rosettes, or even simple spots on a fine yellow ground; but in the size and minor arrangement of the open rosettes there is the greatest variation. Col. H. Smith defines the leopard as differing from the panther in being of a paler yellowish colour, of rather smaller size, and with the rosettes made up of several dots partially united into a circular figure in some instances, and into a quadrangular, triangular, or less determinate form in others. But on these very grounds, if there be two species, there must be several more. Once or twice have we seen black leopards or panthers (whichever they be) in which the ground colour is dull black, with spots of a rich glossy black; and Pennant ('Hist. Quad.,' 1793) figures a black leopard in the Tower of London, brought from Bengal by Warren Hastings. Some consider this animal to be a distinct species, and describe it under the title of *Felis melas*. In certain parts of Java, according to Péron, the black leopard is common.

Mr. Bennett ('Gardens and Menagerie of the Zool. Soc.,' 1830) says, 'Whether the leopard and the panther are in reality distinct species, and if so, on what particular characters the specific distinction depends, are questions that have been so variously solved by writers of the highest eminence, that we cannot, without better opportunities for comparison of specimens than we at present possess, adopt the conclusions to which any one of them has come upon the subject.' The fact is this: Suppose it be proved that there are several species of old world *Felidæ* entitled to the names of panther or leopard, how can we tell to which the specific title of *Pardus* and *Leopardus* is applicable? On this point we might waste pages by references to writers whose conclusions end in nothing. The leopard or panther is found in Africa, India, and the Indian Islands, as Ceylon, Sumatra, Java, &c.



Leopard (*Felis leopardus*).

2. The Rimau Dahan (*Felis macrocelis*, Temm.).—a beautiful species, with bold square or angular markings; a native of Sumatra, and discovered there by Sir Stamford Raffles. This form leads the way to the tiger-cats, with marbled markings. (See *Felis marmorata*, 'Proceeds. Zool. Soc.,' 1836, p. 107; and also 'Zool. Journ.,' vol. i.)

3. The Ounce (*Felis uncia*).—Till recently the Ounce (*Once*, Buffon) was confounded either with the leopard or the panther, but it is a decidedly distinct species. Buffon has figured it, and Bewick has copied the figure.

In June 1837 Mr. Gray brought before the notice of a meeting of the Zoological Society of London some mammalia which he had lately purchased for the British Museum from a collection made by the late Colonel Cobb in India, among which was an adult specimen of the *Once* of Buffon ('Hist. Nat.'), on which Schreber formed his *Felis uncia*, which has been regarded by Cuvier, Temminck, and most succeeding authors as a leopard, but which, continued Mr. Gray, 'is a distinct species, easily known by the thickness of its fur, the paleness of its colour, the irregular form of the spots, and especially by the great length and thickness of the tail.' Mr. Gray observed, that a more detailed description of this animal was unnecessary, as it agreed in all particulars with the specimen described by Buffon.

4. The Cheetah, or Hunting Leopard (*Felis jubata*, Schreber, *Cynailurus jubatus*, Wagler).—The Cheetah, or Chetah, is a slender but tall animal, with wiry limbs, and with claws but slightly retractile. It is extensively spread through Africa and the warmer parts of Asia, and in India and Persia it is domesticated and trained to the chase or rather the surprisal of the antelope, towards which it creeps stealthily until within range of its spring. The general colour of the cheetah is fawn yellow, variegated with round black spots; a distinct black stripe passes from the inner angle of the eye to the angle of the mouth; the tip of the nose is black. The profile of the forehead and face is convex; the eye is peculiarly large, fine, and expressive; the pupils are circular. The tail is long and curled up at its extremity, which is white. The fur is rather crisp, and on the neck and shoulders is longer than elsewhere, and forms a sort of mane.

5. The Jaguar or American Panther (*Felis onça* of Linnæus).—This formidable animal is larger, and more robust and stoutly made, than the leopard. The head is larger and rather shorter than that of the leopard, and the profile of the forehead more prominent; the limbs are more thick and muscular, and the tail shorter. Specimens of this savage beast have been confounded with the leopard; but the Jaguar, besides differing in other points, always displays a bold streak or two of black extending across the chest from shoulder to shoulder. The rosettes on the body are very large, open, and somewhat angular, with a central spot or two of black in each; a chain of black dashes extends along the spine.

Of all the American *Felidæ* the jaguar is the most formidable. It prefers the wooded and marshy districts of the warmer regions, and is common in Paraguay and Brazil. According to Humboldt 4000 of these beasts are annually killed in the Spanish territories, and 2000 skins are exported every year from Buenos Ayres only. The Jaguar climbs with the utmost ease, and chases the monkeys among the branches. It also swims well, crossing broad rivers with ease. Birds, fish, turtles, peccaries, capybaras, monkeys, and domestic quadrupeds are its prey, but it seldom voluntarily attacks man: when hard pressed however, it makes a resolute defence.

There is a black variety of the Jaguar, *Le Jaguar Noir* of the French, *Felis nigra* of Erxleben, and probably the *Jaguarete* of Marcgrave. This seems to have been the animal noticed by Lieut. Maw, R.N. ('Journal of a Passage from the Pacific to the Atlantic,' 8vo., London, 1829), at Para, as a 'black onça, or tiger.' It had been procured up the rivers by Mr. Campbell, and, when Mr. Maw saw it, was a formidable animal. 'I am not sure,' says that gentleman, 'that it had the length of limb of a Bengal tiger; but it was thicker, and I think it would have weighed more. When lying down, there appeared to be scarcely any leg, but its thigh was like an immense ham.' Lieut. Maw relates some amusing anecdotes about this animal, for which we refer the reader to his interesting book.

The *Chati*, the *Ocelots*, and other *Tiger-Cats*, are noticed under the article TIGERS. The *Puma* is described under the article LION.

LEOPOLD I., emperor of Germany, of the house of Austria, son of Ferdinand III. and of Mary Anne of Spain, born in 1640, was proclaimed king of Hungary in 1655, king of Bohemia in 1657, and emperor of Germany in 1659. The Turks, who were then overrunning Hungary, were joined by a large portion of the Hungarians under Emeric Tekeli, and gained several victories over the Emperor. Louis XIV., who had encouraged the Turks in their invasion, now formed a plot, by means of his diplomatic agent at Cracow, to dethrone Sobieski, who had promised to assist Leopold. The plot however was discovered by means of an intercepted letter written by the French ambassador. Sobieski laid the matter before the Polish diet, expressing at the same time his conviction, whether real or politically assumed, that the whole was a fabrication. 'But,' added he, 'let us convince the world also that it is an imposture; let us declare war against the infidels.' The declaration was voted almost unanimously. On Sept. 11, 1683, the allied army reached the summit of the Calemberg, which commanded a view of the Austrian capital, then invested by the Turks. On the 12th the battle was fought, the Turks were defeated, and Vienna and perhaps all eastern Europe were saved.

At the Diet of Presburg of 1687 the crown of Hungary was declared to be no longer elective, but hereditary in the Austrian male line. Transylvania likewise submitted to Leopold. The Turkish war was at length concluded by a great victory gained by Prince Eugene, in Sept. 1697, near Zenta in Hungary, which was followed by the peace of Carlowitz.

Leopold sustained three wars commenced by Louis XIV. The first was ended by the treaty of Nymwegen in 1679, and the second by the peace of Ryswick, in 1697. The third was that of the Spanish Succession, to which Leopold's son the archduke Charles had undoubted claims. Leopold however did not live to see the termination of it; he died in 1705.

The principal internal events in Germany during the reign of Leopold are: 1. The establishment of a ninth electorate in favour of Ernest Augustus, Duke of Brunswick Lüneburg, who in 1692 became the first elector of Hanover. 2. The assumption of the regal title by Frederic, elector of Brandenberg and duke of Prussia, in 1701. 3. The establishment of a permanent Diet, attended, not by the electors in person, but by their representatives. Leopold's private character was estimable, and his disposition was good and well-meaning, but he was weak, irresolute, and inclined to bigotry. He was succeeded by his eldest son, Joseph I.

LEOPOLD II. of Germany, and I. of Tuscany, was the second son of Maria Theresa of Austria and Francis of Lorraine. He succeeded to the Grand Duchy of Tuscany in 1765, and fixed his residence at Florence. During the five-and-twenty years of his administration he greatly improved the condition of Tuscany. By his 'Motu proprio,' in 1786, he promulgated a new criminal code, abolished torture and the punishment of death, and established penitentaries to reclaim offenders. He finally abolished the Inquisition in Tuscany in July 1782, and placed the monks and nuns of his dominions under the jurisdiction of the respective bishops. This he effected through the agency of Ricci, bishop of Pistoia. The whole of the curious controversy which followed with the Court of Rome is given in Potter's work 'Vie de Scipion de Ricci,' 3 vols., Brussels, 1825. In his civil administration Leopold effected many important reforms.

By the death of his brother Joseph II., Feb. 20, 1790, Leopold succeeded to his dominions, and was elected Emperor of Germany, whilst his son Ferdinand succeeded him as Grand Duke of Tuscany. On assuming the administration of the hereditary dominions of the house of Austria, Leopold showed an earnest desire to please his subjects, and he succeeded; he abolished the more obnoxious innovations of his brother; he concluded a peace with the Porte; he pacified Hungary; and, having done this, his next step was to endeavour to pacify the revolted states of the Netherlands, by offering to re-establish their ancient constitutions. The insurgents having obstinately refused to listen to his offers, he sent troops against them, and recovered without much difficulty those fine provinces. Then came anxieties concerning the fate of his sister Antoinette, queen of France, and her husband; the convention of Reichenbach, and that of Pilnitz, in August 1791, between Austria and Prussia, for the purpose of checking the progress of French revolutionary proselytism. But the intentions of Leopold were essentially pacific. In

the midst of all these cares Leopold died, March 1st, 1792, aged 44. He was succeeded by his eldest son, Francis II.

LEOSTHENES was one of the last successful generals of Athens. His first exploit was the defeat of the Bœotians, near Platæa. After this he took post at Pylæ, to prevent the entrance of Antipater into Greece, defeated him, and shut him up in Lamia, a town in Thessaly, to which he laid siege; and from that siege the Lamian War has its name. Leosthenes was killed in the course of it; and after his death success deserted the Athenian arms. [ANTIPATER.] He left a high reputation. His picture, painted by Arcesilaus, is mentioned by Pausanias (1, c. i.) as one of the objects in the Peiræus worthy of notice.

LEPANTO, GULF OF, the ancient Corinthian Gulf, is a narrow sea above seventy miles in length from west to east, extending between the northern coast of the Peloponnesus and the mainland of Greece. It is entered from the Gulf of Patras on the western side by a strait not quite two miles wide, which is defended by two castles. A few miles inside of the straits, on the northern coast, is the town of *Lepanto*, the ancient *Naupactos*, built on a hill, and commanded by a castle, with a good harbour, and between 2000 and 3000 inhabitants. The gulf widens towards the middle to the breadth of 12 or 13 miles, exclusive of several deep bays which indent its northern coast, especially the Bay of Salona, the ancient Crissæan Gulf, which stretches about 8 miles to the north. The eastern extremity of the Gulf of Lepanto terminates in two bays: that of Corinth to the south-east, where the Lechæum or western harbour of Corinth once was; and the other, which extends to the north-east, bordering on the territory of Mégaris and stretching to the foot of Mount Cithæron. This last bay is now called Livadostro.

Lepanto has given its name to a celebrated naval battle fought on the 7th October, 1571, in which the Christian allied fleet, amounting to 210 ships in all, commanded by John of Austria, utterly defeated the Turkish fleet of 300 sail under Ali Pasha, who lost his life in the engagement. Cervantes fought in this battle, and received a wound which deprived him of the use of his left hand for the rest of his life. The battle of Lepanto is called by some Italian writers the battle of Curzolari, from the group of islets so called at the mouth of the Achelous, where the battle commenced.

LEPEDOLITE, *Lilac Mica*, occurs massive, and is usually composed of small flexible thin scales. The colour varies. Before the blow-pipe it melts into a spongy semi-transparent white globule. It consists mainly of silica and alumina.

LEPIDI, the name of one of the most distinguished families of the patrician gens of ÆMILII. Those most worthy of notice are:—

1. Marcus Æmilius Lepidus, who was sent as ambassador to Ptolemæus, king of Egypt, at the close of the Second Punic War, B.C. 201. He obtained the consulship B.C. 187, and again in B.C. 175. In B.C. 179 he was elected Pontifex Maximus and Censor. He was Princeps Senatus six times. He died B.C. 150.

2. Marcus Æmilius Lepidus, Prætor B.C. 81; after which he obtained the province of Sicily. In his consulship, B.C. 78, he endeavoured to rescind the measures of Sulla, but was driven out of Italy by his colleague Quintus Catulus, and by Pompeius, and retired to Sardinia, where he died in the following year.

3. Marcus Æmilius Lepidus, the Triumvir, the son of the preceding, was Ædile B.C. 52, and Prætor B.C. 49, in which year Cæsar came to an open rupture with the senatorian party. [CÆSAR; ANTONIUS.] Lepidus from his entrance into public life opposed the senatorian party; and his great riches and family connections made him an important accession to the popular cause. On the first expedition of Cæsar into Spain, Lepidus was left in charge of the city. During Cæsar's absence, Lepidus proposed the law by which Cæsar was created Dictator.

In the following year, B.C. 48, he obtained the province of Hispania Citerior, with the title of Proconsul, and in B.C. 46 was made consul with Cæsar, and at the same time his master of the horse. In B.C. 44 he was again made master of the horse, and appointed to the provinces of Gallia Narbonensis and Hispania Citerior; but he did not immediately leave Rome. After the death of Cæsar, Lepidus was courted by both parties. Lepidus promised to assist the Senate, but at the same time carried on a secret negotiation with Antonius. On his arrival in his province, being ordered by the Senate to join Decimus Brutus, instead of obeying, he united his forces with those of Antonius.

In the autumn of this year, B.C. 43, the celebrated triumvirate was established between Antonius, Lepidus, and Octavianus (Augustus); and, in the division of the provinces, Lepidus received Spain and Gallia Narbonensis. The conduct of the war against Brutus and Cassius was assigned to Antonius and Augustus; while the charge of the city was intrusted to Lepidus, who was again elected consul (B.C. 43). After the defeat of Brutus and Cassius, in the new division of the provinces which was made after the battle of Philippi, Spain and Gallia Narbonensis were taken from Lepidus and Africa given to him instead. Lepidus had now lost all authority; but he was again included in the triumvirate, when it was renewed B.C. 37. In the following year he was summoned from Africa to assist Augustus in Sicily against Sextus Pompeius; and he landed with a large army, by means of which he endeavoured to regain his lost power. But, being deserted by his own troops, he was obliged to implore the mercy of Augustus, who spared his life, and allowed him to retain his private property and the dignity of Pontifex Maximus, which he had obtained on the death of Julius Cæsar, but he banished him, according to Suetonius, to Circeii ('Octav.' c. 16).

After the battle of Actium, his son formed a conspiracy for the assassination of Augustus on his return from the East, which was discovered by Mæcenas; and Lepidus, having incurred the suspicion of his former colleague, repaired to Rome, where he was treated, according to Dion Cassius, with studied contempt. He died B.C. 12.

(Cicero's *Letters and Orations;* Cæsar's *Civil War;* the *Epitomes* of Livy, Dion, Appian, &c.; Clinton's *Fasti Hellenici;* and Drumann's *Geschichte Roms.*)

LEPI'DIUM (from λεπίς, a scale, in allusion to the form of the pods, which resemble little scales), a genus of plants belonging to the natural order *Cruciferæ*. *L. sativum* is the common Garden Cress. It is a native of Persia and the island of Cyprus in corn-fields. There are three varieties of the species: the broad-leaved cress, which is cultivated chiefly for rearing young turkeys; the curled variety, which is sometimes used as a salad, but is considered preferable as a garnish; and the common plain-leaved cress, which forms one of our earliest spring salads, and has a peculiarly warm and grateful relish. All the varieties are raised from seed, of which one ounce will serve for a bed four feet square.

L. latifolium is a native of Europe, also of Algiers, and of several parts of England, generally near the sea. It has a very hot biting taste, and has been used instead of horse-radish. Poor people are in the habit of eating it as a condiment to their food, hence it has acquired the name of Poor Man's Pepper.

LEPIDODE'NDRON, an important genus of fossil plants, in the examination of which Sternberg, Brongniart, and Lindley, have signalised their abilities, not without success, though some uncertainty yet attaches to the botanical relations of these singular specimens of the flora of earlier nature. M. Brongniart referred the *Lepidodendra* to the natural group of *Lycopodiaceæ*, pointing out however their analogies to *Cycadeæ* and *Coniferæ*.

Dr. Lindley, in the first volume of the 'Fossil Flora of Great Britain,' after discussing the botanical relations of *Lepidodendra*, remarks, 'On the whole, we are led to conclude that the Lepidodendron genus was not exactly like either *Coniferæ*, or *Lycopodiaceæ*, but that it occupied an intermediate station between these two orders, approaching more nearly to the latter than the former.' These views have since been confirmed by later discoveries. The species are numerous, and confined to the older strata, and specially abundant in the coal formation. [Coal Plants.]

LEPIDOPHY'LLUM. Fossil leaves which occur in the coal formation are thus named by M. Brongniart. Some of these belong to *Lepidodendron*, others to *Stigmaria*.

LEPIDO'PTERA, one of the orders into which insects are divided, called *Glossata* by Fabricius.

This order is composed of those insects which are commonly known by the names of Butterflies and Moths, and which possess four wings, usually of large size, and covered with a multitude of minute scales, which to the naked eye appear like powder. The nervures of the wings are not very numerous, and are disposed chiefly in a longitudinal direction: a small tippet-like appendage is situated on each side of the thorax at the base of the wings, which appendages are called by Latreille *pterygoda*. The antennæ are almost always distinct, and are composed of numerous minute joints. The parts of the mouth are formed into a proboscis fitted for extracting the nectar from flowers, or conveying other juices to the œsophagus. This proboscis, when not in use, lies spirally folded beneath the head and between two palpi covered with hair, which are usually directed forwards and upwards, and which represent the labial palpi. The proboscis is called, in these insects, *antlia* by Messrs. Kirby and Spence, *spiritrompe* by Latreille, and *lingua* according to the nomenclature of Fabricius, and is composed of two subcylindrical tubes, which vary greatly in length in the different species of lepidopterous insects, and between which there is an intermediate one, formed by their junction, which is effected by means of a series of hooks inosculating one with another like the laminæ of a feather. It is through this central tube that the juices are conveyed, the lateral tubes being intended, as it is supposed, for the reception of air; they are called by Messrs. Kirby and Spence *solenaria*, a name however which is not wanted, since the two tubes in question represent the maxillæ, and are furnished with minute maxillary palpi at their base. The mandibles and labrum in these insects are reduced to mere rudiments. The head, thorax, and abdomen are always more or less covered with hair; the former, besides the ordinary compound eyes, is sometimes furnished with simple eyes or stemmata; these however are generally hidden by the hair of the head, and do not exist in the diurnal lepidoptera.

The food of the larvæ almost always consists of vegetable substances, generally the leaves of plants. Some live in rotten or rather dead wood, upon which they feed; others feed upon animal substances, and are very destructive to furs, woollen goods, feathers, &c.; and the larva of a species of moth (the Honeycomb moth, *Galleria cereana*) subsists upon wax, living in bee-hives*.

The *pupæ*, or chrysalises, are incapable of eating or locomotion, and are termed obtected; they usually approach somewhat to an oval form, but are pointed more or less at the posterior extremity. The shape of the pupæ however varies much according to the species; and those of Butterflies often present numerous angular projections, and sometimes exhibit brilliant metallic colours. The parts of the perfect insect, such as the head, thorax, segments of the abdomen, wings, and legs, can be distinctly traced.

Latreille divides this order into three principal groups, according with the three Linnæan genera *Papilio*, *Sphinx*, and *Phalæna*. To this first group he applies the name *Diurna; Crepuscularia* is used to designate the second; and the third group, or that corresponding to Phalæna of Linnæus, is called by Latreille *Nocturna*.

LEPIDO'STROBUS. M. Brongniart gave this name to the Fossil Fruits, supposed to be those of the *Lepidodendra*, which frequently occur in the coal formation, as at Coalbrook Dale, near Bradford, &c.

* This larva forms galleries in the honeycomb, which are invariably inclosed by a strong silken web, serving to protect it from the bees; and, as the moths increase rapidly in number, the hive is of necessity soon deserted by its proper inhabitants.

LEPONTIAN ALPS. [ALPS.]

LEP'ORIDÆ, a family of Rodents, the type of which may be considered as existing in the Common Hare.

Cuvier characterises the Hares as having the upper incisor teeth double, that is to say, each of them has, behind, another smaller one. Their molars, to the number of five, are formed each of two vertical laminæ soldered together. In the upper jaw there is a sixth, which is simple and very small. They have five toes before and four behind, an enormous *cæcum* five or six times larger than the stomach, and furnished within with a spiral lamina, which runs throughout its length. The interior of their mouth and the bottom of their feet are furnished with hair, like the rest of their body. He divides the group into—

1. The Hares, properly so called, which have long ears, a short tail, the hind feet much longer than the fore-feet, imperfect clavicles, and the sub-orbital space in the skeleton pierced like net-work. The species are, he observes, rather numerous, and so much alike that it is difficult to define them.

The Common Hare, *Lepus timidus*, which is generally considered as the type, is too well known to need description, and it will suffice to state that it is the Λαγώς (Lagus) of the Greeks; *Lepus* of the ancient Italians; *Lepre* and *Lievora* of the modern Italians; *Liebre* and *Lebratillo* of the Spaniards; *Lièvre* of the French; *Has*, *Haas*, and *Hase* of the Germans; *Maukin* of the Scotch.

We must here notice the Irish Hare, *Lepus Hibernicus*. The Earl of Derby appears to have been the first who drew particular attention to it, and it was described in the 'Proceedings of the Zoological Society' by Mr. Yarrell in 1833. Mr. Jenyns gives it as a variety of *Lepus timidus*; but Mr. Bell ('British Quadrupeds') states that a careful examination of several specimens has assured him that it is not merely a variety of the common Hare of England, but that it is specifically distinct. It further appears that *Lepus Hibernicus* is the only Hare found in Ireland, which may account for its remaining so long unnoticed; for opportunities of comparison could not have been very frequent. Its fur is considered valueless.

The Varying Hare, or Alpine Hare, *Lepus variabilis* of Pallas, which changes the colour of its coat with the seasons, requires a short notice. The fur, which is full and soft, is, in summer, gray, intermixed with silky hair of a yellowish brown; the ears are tipped with black, and the under parts are light gray. The tail is white beneath and gray above. As the winter approaches, the fur gradually becomes white, except that on the lips and the tips of the ears, which remains black. In the 'Edinburgh Philosophical Journal,' vol. ii., is an interesting account of the process as it occurs in Scotland, from which it would seem that the winter change of colour takes place without any removal of the hair, as in the Ermine.

The Rabbit, or Coney, *Lepus cuniculus*, Linn., *Coniglio*, of the Italians, *Conejo* of the Spanish, *Kaninchin* of the Germans, is known to every one.

2. *Lagomys*. The species composing this division have the ears moderate, the legs not much differing from each other, nearly perfect clavicles, and no tail: they have hitherto, he adds, been only found recent in Siberia, and fossil remains of an unknown species have been detected in the osseous breccia of Corsica.

In the genus *Lagomys* the muzzle is acute; the ears short and somewhat rounded; the soles of the feet hairy; the claws falcular; no tail. Locality, Northern Asia.

Example.—*Lagomys pusillus*. This species (*Lepus pusillus* of Pallas; Calling Hare of Pennant) has the head longer than is usual with Hares, and thickly covered with fur, even to the tip of the nose; numerous hairs in the whiskers; ears large and rounded; legs very short; soles furred beneath; its whole coat very soft, long, and smooth, with a thick long fine down beneath, of a brownish lead colour; the hairs of the same colour, towards the ends of a light gray, and tipt with black; the lower part of the body hoary; the sides and ends of the fur yellowish. Length about six inches; weight from 3¼ to 4½ ounces; in winter scarcely 2½ ounces. (Pallas, Pennant.)

Calling Hare (*Lagomys pusillus*).

Localities.—The south-east parts of Russia, and about all the ridge spreading from the Ural chain to the south, about the Irtish, and in the west part of the Altaic chain, but nowhere in the East beyond the Oby. (Pallas, Pennant.)

Habits.—Delighting in the most sunny valleys and hills, where the herbage is plentiful and delicate, the Calling Hares choose these localities when in the vicinity of a wood, which will afford them a ready refuge in the case of danger or alarm. Their burrows, especially those belonging to the old ones and to females, are curious and intricate, so well concealed amid the shrubs or some dry spot that detection is very difficult; and to increase the difficulty, the animal is said to drop its excrements under some bush, that they may not betray its abode, which would almost defy search, were it not for their peculiar cry or call: this is described as being like the piping of a quail, but deeper, and so loud as to be heard at the distance of half a German mile. It is repeated at just intervals, thrice, four times, and even six, at night and morning, but seldom in the day, unless the weather be cloudy. Both the male and female emit this note, but the latter is silent for some time after she has given birth (in May) to her young, which are born naked and blind, and

are carefully attended to by the mother, who covers them up warm with the cosy materials of her nest.

Fossil Leporidæ.—Of the genus *Lepus* the following species are named: *Lepus diluvianus*, Hare of the Caverns, Cuvier, Buckland, Pander, and D'Alton; *Lepus priscus*, Hare of the osseous breccias, Cuvier. Fossil Hares and Rabbits are also recorded by other geologists.

LEPRA (the Greek word λέπρα, scaliness), an affection of the skin. It is characterised by an eruption of circular spots of inflamed skin covered with scales, varying from the size of a pin's head to that of a shilling or even a half-crown piece, occasionally mixed with large irregular patches formed by the coalescing of the borders of several contiguous spots. The whole is surrounded by a slight areola of redness. In the early stage of the disease, and in the small spots, the inflamed skin, which is slightly raised above the surrounding parts, possesses only a thin scaly covering; and in the larger patches, formed by the coalescence of several spots, the characteristic appearances become somewhat confused; still, on careful examination, the elevated margin, circular outline, and central free spot may more or less be recognised.

It is generally tedious of cure, recurring periodically in some constitutions, whilst in others it will continue for two or three years. Most frequently it arises without any assignable cause; but occasionally it has appeared to be dependent upon suddenly suppressed cutaneous transpiration in consequence of drinking cold water when overheated.

LEPROSY. [LEPRA.]

LEPTACANTHUS, a genus of fossil placoid fishes, occurring in the carboniferous and oolitic strata. (Agassiz.)

LEPTÆNA, a subdivision of the great family of fossil *Brachiopoda*, proposed by Dalman to include species which Mr. Sowerby named *Producta*. Its use is at present more restricted, and has become rather indefinite. *Leptæna lata* of the Silurian system may be regarded as a frequent type. The species are extinct, and are confined to palæozoic strata.

LE'PTIDES, a sub-family of dipterous insects of the family *Brachystoma* (Macquart). The family of insects to which the present section belongs is distinguished by the proboscis being short and membranous; the lips terminal and thick; third joint of the antennæ simple, often spatulate; stylet often dorsal; abdomen usually with five distinct segments. The wings have commonly one submarginal and three posterior cells. The family *Brachystoma* is divided by Macquart into four tribes or sub-families—*Xylotomæ*, *Leptides*, *Dolichopoda*, and *Syrphidæ*. The first, or the *Xylotomæ*, are distinguished by the third joint of the antennæ being conical, by the wing having two submarginal cells, and by the tarsi being furnished with two small cushions. In the sub-family *Leptides* the antennæ are inserted near the base of the head, and have generally a terminal stylet; the tarsi are furnished with three small cushions; the femora are elongated; the wings have two submarginal and generally five posterior cells. The Leptides are remarkable for the habits of their larvæ, which excavate funnel-shaped cavities in the sand, and, secreting themselves at the bottom, lie in wait for their prey. When an insect falls into the pit, the larva of the *Leptis* suddenly rising seizes it, and clasping the body sucks out the juices, after which it flings away the carcass. The sub-family *Dolichopoda* is distinguished by the second joint of the palpi being membranous, depressed, and covering the base of the proboscis. The stylet of the antennæ is sometimes dorsal and sometimes apical; the eyes are generally separated in both sexes; the abdomen is somewhat cylindrical, or approaches a conical form; wings decumbent, without any discoidal cell, and generally possessing four posterior cells. The sub-family *Syrphidæ* is a very extensive group, and, although given by Macquart as a division of his family *Brachystoma*, certainly constitutes a section of higher value than a sub-family. [SYRPHIDÆ.]

LEPTOCE'PHALUS, a remarkable fish of the Eel tribe, discovered on the British coast in Pennant's time, and since observed in the Mediterranean. The *Leptocephalus Morrisii* is a small, slender, and compressed animal, as thin as a piece of tape, and at first sight resembling a marine worm. The head is extremely small and short, the eyes large, the jaws furnished with numerous minute teeth, the pectoral fins and gill-openings very small, and the anal and dorsal fins connected with the tail. The outline of the body resembles that of the Lancelet (*Branchiostoma*); but the organisation of the *Leptocephalus* is that of a perfect fish. Mr. Yarrell describes the vertebræ as having no spinous processes. It lives among sea-weed.

LEPTOCO'NCHUS, Dr. Rüppell's name for a genus of pectinibranchiated gastropodous Mollusks, remarkable for their subglobular, delicate, fragile, translucent shell. Example, *Leptoconchus striatus*, Rüpp. Locality, the Red Sea, where it is found imbedded in coral (*Mæandrina Phrygia*), having no communication with the water except by a moderate opening.

LEPTOPHI'NA, Mr. Bell's name for a sub-family of snakes belonging to the family *Colubridæ*. All the species are arboreal in their habits, entwining themselves among the branches of trees, and gliding from one to another with great rapidity. They are extremely elongated and slender in form, and glitter with metallic hues. Their food consists of young birds, large insects, &c. Two genera are described, *Dryinus* and *Leptophis*.

LEPTOSO'MUS, a genus of birds established by Vieillot, and belonging to the family *Cuculidæ*. Example, *Leptosomus afer*; *Cuculus afer*, Gmel.; Edolian Cuckoo of Shaw, noticed by Major James Franklin, F.R.S., in his 'Catalogue of Birds' collected on the Ganges, between Calcutta and Benares, and in the Vindhyan Mountains. (*Zool. Proc.* 1830-31.)

LEPUS. [LEPORIDÆ.]

LEPUS (the Hare), one of the old constellations, said by Hyginus to be in the act of running from Orion's dog, which is the greater dog accord-

ing to some, and the lesser according to others. It is situated directly under Orion.

LERIDA. [Cataluna.]

LERISTA, a genus of reptiles belonging to the family *Scincidæ*, established by Mr. Bell, and thus characterised by him:—Head scutated; no eyelids; the ears hidden under the skin; the body slender; the scales smooth and equal; feet four; the anterior little, very short, and didactylous; the posterior longer, and tridactylous; vent simple, semicircular. Example, *Lerista lineata*, which is bronze green, paler beneath, with two dorsal and two lateral black lines. Locality, Australia. (*Zool. Proc.* 1833.)

LERNÆA, the *Lernæans*, which M. de Blainville collected into a family with that name, are parasitic animals adhering to fishes, and have presented some difficulty to zoologists as to their natural position. Cuvier placed them at the end of his *Intestinaux Cavitaires*, Cavitary Intestinal Worms, *Entozoa Nematoidea* of Rudolphi, but as a very different family, and requiring to be divided into many genera when their economy is better known. The better opinion seems to be that they are crustaceans, and M. Milne Edwards (1834) so considers them.

LEROI, JULIEN DAVID, born in 1724, was the son of an eminent watchmaker at Paris. He applied himself to the study of architecture in a very different manner from the plodding routine then established. After passing some years at Rome, he visited Greece in 1754. On his return, he gave the world the fruits of his researches in his 'Ruines des plus beaux Monumens de la Grèce.' He died at Paris, in January 1803. Leroi published several other works, among which are 'Histoire de la Disposition, &c., des Temples des Chrétiens,' 8vo., 1764; 'Observations sur les Edifices des Anciens Peuples,' 8vo., 1767; and 'De la Marine des Anciens Peuples,' 8vo., 1777.

LESBONAX, a Greek rhetorician and philosopher, was a native of Mityléne. He lived in the times of Augustus.

Photius says ('Cod.' 64) that he had read sixteen orations of Lesbonax, of which however only two have come down to us: they are printed in the eighth volume of the 'Oratores Græci' of Reiski.

There was also a grammarian of the name of Lesbonax, who probably lived at a later period, who wrote a work entitled Περὶ Σχημάτων, 'concerning grammatical figures,' &c., which was first published by Valcknaer in his edition of Ammonius, p. 177–188.

LESBOS, a large island of the Ægean Sea, near the coast of Asia Minor, being separated from the coast of Troas by the Adramyttian Gulf. Its length is 50 miles from Cape Sigrium, which is its north-western extremity, to Cape Malia, at its south-east end, which last looks into the entrance of the Gulf of Smyrna. The breadth of the island is very unequal, owing to some deep gulfs which indent its coast, and varies from seven to fifteen miles. Mitylene, the chief town of the island, lies on the south-eastern shore opposite the coast of the ancient Æolis. It had formerly two harbours, was a place of great importance, and sent out numerous colonies. *Mitylene* still exists as a village, and gives its name to the island. *Methymna*, another ancient town of Lesbos, stood on its north-east coast, opposite Cape Lectum on the coast of Troas. The island has many villages, but no town of any importance, and contains about 40,000 inhabitants, Greeks and Turks. It is one of the most fertile and beautiful of the Greek islands. Its oil and figs are reckoned the best in the Archipelago. It produced the best musicians of Greece; some of its first lyric poets, Alcæus and Sappho among the rest; several distinguished philosophers and rhetoricians, among others Theophrastus, Diophanes the friend of Tiberius Gracchus, Theophanes the friend of Pompeius, and Potamon, who lived at Rome, under the Emperor Tiberius. The historian Hellanicus was a native of Lesbos, as well as the musician Terpander.

The earliest inhabitants of Lesbos are said to have been Pelasgians. It was afterwards colonised by the Æolians in their great migration. After the conquest of the Lydian kingdom by Cyrus, Lesbos was obliged to submit to the power of Persia. After the battle of Mycale (479 B.C.) Lesbos freed itself from Persian dependence, and became the ally of Athens. During the Peloponnesian War, the people of Mitylene being accused of a secret negotiation with the Lacedæmonians, Athens sent a fleet against them. The other cities in the island, except Methymna, made common cause with Mitylene. After some resistance the Athenians gained a complete victory, when the walls of Mitylene were razed, many of its wealthier inhabitants put to death, and the island divided among the Athenians, except the territory of Methymna.

Lesbos passed successively under the dominion of the Macedonians, the Romans, and the Byzantines. It was afterwards captured by the Venetians, A.D. 1185, was recaptured by the Greeks, and at last seized by the Turks, who retain it to this day.

LESCOT, PIERRE, is generally supposed to have designed and commenced, together with Jean Goujon, the present palace of the Louvre for Francis I. and Henry II. Lescot was born, according to some accounts, about 1510, and lived to the age of sixty; other accounts give the dates 1518 and 1578 as the years of his birth and death. He erected the southern and western sides of the quadrangle; but all that now remains by Lescot is the western side, facing the Tuileries, known as the Vieux Louvre.

LESGHISTHAN. [Georgia.]

LESLIE, CHARLES, born about 1650, was a writer of politics and theology, some of whose productions, especially 'A short and Easy Way with the Deists,' are still read and esteemed. He was the son of an Irish prelate, and was educated at Trinity College, Dublin. In 1671 he entered himself for the English bar, but abandoned the profession for divinity, and became Chancellor of Cloyne. Though a zealous Protestant, he attached himself to King James and his son, and lived openly at the court of the latter. But he ultimately returned to Ireland, and died at Glaslock, county Monaghan, in 1722.

LESLIE, SIR JOHN, was born April

1766, at Largo, a village on the coast of Fifeshire. He studied at the University of St. Andrews, and afterwards travelled in America as a private tutor. He eventually became a contributor to the 'Monthly Review,' in London, and furnished notes for a new edition of the Bible. After spending some years on the Continent, he was elected to the Professorship of Mathematics in the University of Edinburgh. At this period his only production relative to pure mathematics was an essay on 'The Resolution of Indeterminate Equations.' In 1809 Mr. Leslie was called to the chair of Natural Philosophy. He was knighted June 27, 1832, and died Nov. 3 in the same year, at his residence in Fifeshire.

Besides some other works, Sir J. Leslie has left—'Elements of Geometry, Geometrical Analysis, and Plane Trigonometry,' 8vo., 1809; the same abridged, 1828; 'Geometry of Curve Lines,' 8vo., 1821; 'Philosophy of Arithmetic,' 1817; 'Account of Experiments and Instruments depending on the relations of Air to Heat and Moisture,' 12mo., 1813; 'Elements of Natural Philosophy,' vol. i. (containing Mechanics and Hydrostatics), 8vo., 1823. Sir J. Leslie also furnished several important papers to the 'Edinburgh Philosophical Transactions,' the 'Encyclopædia Britannica,' the 'Edinburgh Review,' and to Nicholson's 'Philosophical Journal.' Some papers on physical subjects were also read before the Royal Society of London, but none were ever printed in their 'Transactions.'

LESPARRE. [GIRONDE.]

L'ESPINASSE, MADEMOISELLE, the name of a lady much celebrated in the Parisian literary circles soon after the middle of last century, was born in 1732. She is supposed to have been the illegitimate daughter of people of rank. She was employed to read to and converse with Madame du Deffand in her blindness; but, being ambitious, well-informed, and eloquent, she attracted the interest of the circle surrounding Madame du Deffand to herself. In 1764, when D'Alembert fell ill she nursed him with zeal, and thenceforth he resided in her house. She died in 1776, to the great grief of D'Alembert, whom she had long mortified by not returning his affection. Three volumes of her love-letters, conspicuous for very ardent eloquence, were published in 1809.

LESSINES. [HAINAULT.]

LESSING, GOTTHOLD EPHRAIM, was born at Kamentz in Upper Lusatia, of which place his father was pastor, Jan. 22, 1729. His attachment to reading displayed itself from his earliest childhood. From a school at Meissen he was sent to the university at Leipzig. His first literary productions were one or two minor dramatic pieces, which were printed in a journal entitled 'Ermunterungen zum Vergnügen.'

In conjunction with his friend Mylius he began a quarterly publication at Berlin, 'Beiträge zur Historie des Theaters,' which however was not carried on beyond its fourth number. After some minor speculations, he formed a close intimacy with Moses Mendelsohn and Nicolai, which had a highly beneficial influence upon all the three. One of the first results of Lessing's and Mendelsohn's joint studies was the dissertation 'Pope als Metaphysiker' (1754), the object of which was to show that the English poet had no fixed philosophical system. His next work was his 'Miss Sara Sampson,' the first specimen of domestic tragedy in German literature.

In 1757 he and his friends Mendelsohn and Nicolai undertook the 'Bibliothek der Schönen Wissenchaften,' which may fairly be said to have been the best literary journal Germany could then boast. To this period, from 1753 to 1760, during which he resided at Berlin, belong his 'Fables' and his 'Litteraturbriefe,' or 'Letters on Literature' (1759), a life of Sophocles, after the manner of Bayle, and a translation of Diderot's dramatic pieces. From 1760 to 1765 Breslau was his residence, he having accepted the appointment of government secretary to General Von Tauenzien. Here he seems to have injured his health by the excitement of the faro-table; but, eventually giving up both play and his appointment, he returned to Berlin, and the following year published his celebrated 'Laocoon.' The following year was marked by another triumph, namely, his 'Minna von Barnhelm,' and the succeeding one by his 'Dramaturgie' and the 'Antiquarische Briefe.' His friend Ebert obtained for him the situation of keeper at the Wolfenbüttel Library (1770), of which collection he published an account entitled 'Wolfenbüttelschen Fragmente,' 1773. His 'Emilie Galotti' was published in 1772. His last drama, 'Nathan,' was also almost the last of all his literary productions. He had entered only into his 53rd year when he died, February 15, 1781.

His brother, Karl Gotthelf Lessing (born 10th July, 1740), who published his biography and some posthumous pieces, in 1793, wrote several comedies, which exhibited considerable dramatic talent.

L'ESTRANGE, SIR ROGER, was born in Norfolk in 1616. Like his father, he was a royalist, and accompanied Charles I. to Scotland in 1639. He was arrested by the emissaries of the parliament in 1644, and sentenced to be shot as a spy, but escaped in 1648, and attempted to raise an insurrection in Kent. This having failed, he fled the country, but returned in 1653, hoping to take advantage of the general act of amnesty. Cromwell having taken his part, his hopes were realised. After the Restoration he was appointed censor of the press, and in 1665 he brought out a paper called the 'Public Intelligencer.' He was devoted to the court, and on the approach of the Revolution of 1688 lost all his appointments. He died in 1704. His works consist of a vast number of political pamphlets, besides indifferent translations of Josephus, Cicero's 'Offices,' Seneca's 'Morals,' Erasmus's 'Colloquies,' Æsop's 'Fables,' Quevedo's 'Visions,' &c., &c.

LE SUEUR, JEAN-FRANÇOIS, knight of the Légion d'Honneur, and director of the music of the Emperor Napoleon, was born in 1766. After having been Maître de Chapelle of several cathedrals in France, for which he composed a great number of masses, motets, &c., his reputation called him to Paris, where he produced his five grand operas:—'La Caverne,' 'Paul et Vir-

ginie,' Télémaque,' 'Les Bardes,' and 'La Mort d'Adam.' His work on music, adapted to sacred solemnities, is highly esteemed.

LETHARGY, a state of unnaturally deep and prolonged sleep, a condition intermediate between the sleep of health and complete coma. If not the result of unusual fatigue, it is often an alarming symptom, indicating congestion of the brain, and a disposition to apoplexy, or even an impending attack of that disease.

LETTER OF CREDIT. [CREDIT, LETTER OF.]

LETTER or POWER OF ATTORNEY is an instrument by which one person authorises another to do some act for him: it may be used in any lawful transaction, as to execute a deed, to collect rents or debts, to sell estates, and other like matters. The authority must be strictly followed. The power which authorises an attorney or agent to do some particular act impliedly includes an authority to do whatever is incident to that act. But the authority never goes beyond that which is given in terms, or is absolutely necessary for carrying the authority into effect.

The authority must be executed during the life of the person who gives it.

Powers of attorney are generally executed by deed, and, where they contain an authority to bind the principal by deed, it is essential that they should be so executed. When the agent signs any instrument which is to bind his principal, he must sign it in the name of the principal, and not in his own name.

A power of attorney, unless it be given as a security, is revocable, either directly, or indirectly by the principal granting a new power to another person. But, if the power has been given as a security, it is not revocable by the principal.

A letter of attorney is also in general revoked by the bankruptcy of the principal, unless it is coupled with an interest.

(Paley's *Principal and Agent*, and the various treatises on mercantile law.)

LETTERKENNY. [DONEGAL.]

LETTERS PATENT, the king's letters, sealed with the great seal. These grants, says Blackstone ('Comment.' b. ii. ch. 21), whether of lands, honours, liberties, franchises, or anything else that can be granted, are contained in charters or letters patent, that is, open letters, *literæ patentes*. They are so called because they are not sealed up, but open to view, with the great seal pendent at the bottom, and are usually directed or addressed by the king to all his subjects at large. They are now frequently granted under the royal authority as the reward of ingenuity, and are in some cases the only means by which a man can secure any compensation for a discovery, or for the labour and expense which he may have employed in perfecting an invention. The consideration of the legal rights of patentees, and of the modes in which they may be acquired and secured, properly belongs to the head of PATENT. Many letters patent have been granted by the king to the founders of schools and other charitable endowments, empowering the donor to make rules and ordinances for the government of his charity, and constituting into a body corporate those persons and their successors whom the founder should choose or nominate.

LETTERS, THREATENING. [THREATS.]

LETTUCE (the *Lactúca sativa*, or Garden Lettuce) is one of the principal kinds of vegetables used for salads. It has been introduced and cultivated in this country for nearly three centuries, but, like many other domesticated plants, its origin is unknown. The excellence of lettuces consists in their being crisp and tender; their growth should therefore be so conducted as to sustain no check or interruption.

The ground intended for the seed should be fresh dug, rich, and mellow. The principal summer crop should be sown in March and April, and the seed lightly covered. If the plants are intended to attain their full perfection, where sown, they must be thinned out to distances of nine inches square in the case of the small cabbage varieties, and the larger sorts should be allowed at least a foot each way. Water should be given, but not at any one time to excess, not merely at the root of each plant, but over the whole of the ground.

The Cos Lettuces require to have their leaves tied together moderately close with a strip of matting, for the purpose of assisting their blanching and rendering them more crisp and delicate. This should be done about a week previous to their attaining full perfection.

LEUCADIA. [SANTA MAURA.]

LEUCHTENBERG is a lordship in the kingdom of Bavaria, which has an area of 84 square miles, and a population of 5800 inhabitants. In 1817, Maximilian Joseph, king of Bavaria, gave it, with the principality of EICHSTADT, to his son-in-law, Eugene Beauharnois, who assumed the title of Duke of Leuchtenberg. The title of royal highness was conferred on the duke and his successors, who were also declared capable of succeeding to the throne, in case the royal line of Bavaria should become extinct.

LEUCIN, a name given by Braconnot to a substance obtained by the action of dilute sulphuric acid upon fibrin. Leucin is white, pulverulent, very soluble in water, and crystallisable. The crystals, when heated to above 212°, fuse and suffer partial decomposition, and exhale an odour of roast meat.

LEUCIPPUS, a Grecian philosopher, is generally regarded as the original propounder of what has been called the atomic philosophy. The time and place of his birth are unknown: he was the disciple of Zeno and the teacher of Democritus, and was born, according to Diogenes Laertius (ix. 30), either at Elis, Abdéra, or in the island of Melos. None of his writings have come down to us, with the exception of a few fragments of a treatise 'On Mind,' which have been preserved by Stobæus.

LEUCISCUS, a genus of fishes of the family *Cyprinidæ*, distinguished by having short and soft anal and dorsal fins, and a mouth unfurnished with barbules. There are many species, well-known inhabitants of the rivers of Europe. Those best known in Britain are the Roach (*Leuciscus*

rutilus), the Dace (*Leuciscus vulgaris*), the Chub (*Leuciscus cephalus*), the Rudd (*Leuciscus erythropthalmus*), the Bleak (*Leuciscus alburnus*), and the Minnow (*Leuciscus phoxinus*). More rare are the Graining (*Leuciscus Lancastriensis*) and Azurine (*Leuciscus cæruleus*), formerly supposed to be peculiar to the north of England, but stated by Agassiz to inhabit certain Swiss lakes. The Dobule (*Leuciscus dobula*), a native of the rivers of Western Germany, has been taken by Mr. Yarrell in the Thames, and the Ide (*Leuciscus idus*) is doubtfully recorded as a native of Scotland. Most of these fishes are sought after by anglers, either for the sport they afford or to be used as bait for pike. None of them are very excellent as food. The roach and chub have been known to attain a weight of five pounds.

LEUCITE, *Amphigene*, occurs imbedded in lava in trapezoidal crystals, and massive; the colour is yellowish white, and the lustre vitreous. The crystals have various degrees of translucency. The massive varieties are granular. It consists chiefly of silica, alumina, and potash.

LEUCO'MA, a white opacity of the cornea. [EYE.] It is the result of acute inflammation producing a deposition of lymph on the surface and in the layers of the cornea, either with or without ulceration of its substance.

LEUCTRA. [EPAMINONDAS.]

LEUNCLA'VIUS, JOHANN (the Latinised form of his real name, Loewenklau), was born in 1553, at Amelburn in Westphalia. He was one of the most distinguished scholars of his age. He was well acquainted with the Latin and Greek languages, the Roman law, and the writings of the Fathers; and also with Turkish, which he learnt during his residence at Constantinople. He died at Vienna, 1593. The most important of his works are—editions of Zosimus, Procopius, &c., Basel, 1579; Manuel Palæologus, Basel, 1578; Dion Cassius, 1606; Xenophon, Basel, 1569; John of Damascus, Basel, 1578; and many treatises of the Fathers.

LEUSDEN, JOHN, was born at Utrecht in 1624. He studied the Oriental languages at the universities of Utrecht and Amsterdam. In 1649 he was appointed professor of Hebrew at Utrecht. He died in 1699. Leusden was one of the best Hebrew scholars of his age.

The most important of his works are—'Philologus Hebræus,' Utrecht, 1656, 1672, Amst., 1686; 'Philologus Hebræo-Mixtus,' Utr., 1633, &c.; 'Philologus Hebræo-Græcus,' Utr., 1670, &c. His other works are numerous. He published several Manuals of Hebrew Grammar, which however are almost entirely taken from Buxtorf. He had commenced an edition of the Syriac version of the New Testament, which was published after his death by Schaaf, Leyd., 1708.

LEUWENHOEK, or LEEUWENHOEK, ANTHONY VAN, was born at Delft, in Holland, in 1632. He does not seem to have had the advantage of a learned education. Dr. De Graaf introduced him to the notice of the Royal Society of London, and the greater number of his discoveries and researches were published in the 'Philosophical Transactions' of that body. In 1680 he was chosen a Fellow of the Royal Society, and he was made a corresponding member of the Academy of Sciences at Paris in 1697. He appears to have passed the whole of his life at his native place, devoting his time to microscopic researches, chiefly relating to anatomy; and the success which attended his observations is said to have principally arisen from his having paid the most minute attention to the grinding and polishing of single lenses, which he always used in preference to the compound microscope.

Leuwenhoek died at Delft in 1723. Besides his contributions to the 'Philosophical Transactions,' he published about 26 papers in the 'Memoirs of the Academy of Sciences.' His writings were collected and published separately in Dutch at Delft and Leyden; they were also translated for him into Latin, and printed at Delft, in 4 vols. 4to., in 1695–99. An English translation was made from the Dutch and Latin editions in 1798–1800, by Mr. Samuel Hoole, in 4to.

LEUZE. [HAINAULT.]

LEVA'NT, or *Levante*, an Italian word which means the East, and which is also commonly used, especially among seafaring and commercial people of the countries bordering on the Mediterranean, to designate the eastern or Asiatic shores of that sea, namely, those of Syria and Asia Minor, the harbours of which are styled 'Scale di Levante,' in French 'Echelles du Levant' ('stairs of the East'). Smyrna, Alexandretta, Beyrout, Acre, the harbours of Cyprus, and other islands near the coast of Asia, are included within this denomination.

LEVANTE, Province. [GENOA.]

LEVELLING is the art of determining the heights or depressions of points on the ground with respect to a spherical or spheroidal surface coinciding nearly with that of the earth, or, when the extent of ground is inconsiderable, with respect to a horizontal plane passing through some given point on the ground.

The relative heights of a series of points on the ground are obtained by means of their vertical distances from others which, on the supposition of the earth being a sphere, are equally distant from its centre; and these, which are called level-points, must be found by an instrument constructed for the purpose. [SPIRIT LEVEL; THEODOLITE.] In general, a choice is made of any convenient stations, A, B, &c., on the line of operation, and the dis-

tances between them are determined by actual admeasurement. The instrument is then set up at or near the middle of the interval between every two such points in succession. When the telescope thus placed, as at *a*, has been rendered horizontal by means of the adjusting screws, an assistant at each of the stations A and B, holding what is called a station staff in a vertical position, moves a vane or index along the staff, upwards or downwards according to the directions of the observer at the telescope, till it appears to coincide with the intersection of two wires in the telescope.

The points thus determined on the staves are represented by *m* and *n*; and these are level-points, or points equally distant from the centre of the earth. Therefore, the heights A*m* and B*n* being read on the graduated staves, the difference between them will give the relative heights of the ground at A and B. A similar process is repeated with respect to the points B and C, the instrument being placed at *b*, midway between them; and the operation is to be continued to the end of the line on which the profile is required. It is customary to insert the heights B*n*, C*q*, &c., in a column headed *Fore-Sights*, in a sort of field-book, and the heights A*m*, B*p*, &c., in a collateral column headed *Back-Sights*. The difference between the sums of the numbers in these two columns will be equal to the height of one extremity of the line bove the other.

It is however very frequently the practice to execute a sort of double-levelling; which consists in placing the instrument successively at each of the stations A and B, a staff being held up vertically at the other, when, the axis of the telescope being at equal heights from the ground at both stations, half the difference between the heights read on the staves will express the heights of A above B. This is strictly correct however only on the supposition that the visual rays at both stations are parallel to one another.

On ascending or descending a steep hill, no other method can be adopted than that of placing the instrument at one extremity of the station-line and the staff at the other; but as these lines are then necessarily very short, the deviation above mentioned need not be regarded.

The profile of the ground is usually expressed on paper, in portions of any convenient length, for the purpose of enabling the engineer to determine the depths of his excavations, or the heights of the masses of earth to be raised, when it is proposed to execute a canal or road. A right line being drawn to represent one parallel to the horizon, and passing through the highest or the lowest point of the natural ground; the heights or depressions of the remarkable points, as A B, &c., with respect to such line, are obtained by additions or subtractions from the numbers in the field-book, and are, by a proper scale, set out from that line on others drawn perpendicularly to it at intervals equal to the horizontal distances between the same points. The series of points thus obtained, being joined by hand or otherwise, give the figure of the required vertical section of the ground.

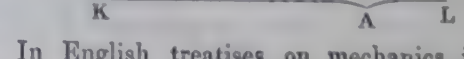
LEVEN, LOCH. [KINROSS-SHIRE.]

LEVER (*levare*, to lift up), the name of a common mechanical instrument, consisting of a simple bar of wood or metal, by fixing one point of which, called the fulcrum, a pressure at the end more distant from the fulcrum is made to counterbalance a larger pressure at the nearer end; or, if both ends be equally distant from the fulcrum, equal pressures are made to balance each other.

The first explanation of the lever was given by Archimedes, and that in so simple a manner, that, while his method has always been the best for a popular view of the subject, it has never been surpassed, or even equalled, in rigour or purity, considered as a foundation for the science of Statics.

It assumes two principles; firstly, that, when a system is in equilibrium, the state of rest will not be disturbed if additional pressures, such as compensate each other, and would by themselves produce no motion, be introduced or removed; secondly, that, when a weight is made to rest by being attached to an immoveable point (say it is suspended by a string), the point or pivot of suspension undergoes a pressure equal to the weight of the system, whatever may be the form of that system, or the dispositions of its parts. Thus, a cylindrical or prismatic bar of uniform material will necessarily rest if a pivot be passed through a section in the middle of its length, since there is no reason why it should preponderate on either side: now, divide the bar into any two parts, and, from their middle points, suspend weights equal to the weights of the parts; also apply counterpoises of equal weights at the same points, by means of strings passing over pulleys; the equilibrium will then be undisturbed; take away from the system the parts of the bar and the counterpoises (which are equal and opposite to one another), and the equilibrium will subsist between the remaining weights, which are those first suspended. The points of suspension being in the middle of the lengths of the two parts are at distances from the pivot (at the middle of the whole length of the bar), which are inversely proportional to the suspended weights.

The most simple way in which the preceding result can be stated is as follows: when a weight V placed at K balances a weight W placed at L, about the pivot A, the number of pounds in V multiplied by the number of feet in KA gives the same product as the number of pounds in W multiplied by the number of feet in AL. (Any other units of weight and length will do equally well, if only the same be used in both.) The product of a pressure and the perpendicular let fall upon its direction from a fixed pivot or fulcrum is sometimes called the moment, sometimes the leverage, of the weight.



In English treatises on mechanics it is customary to call one of the pressures which balance on a lever, the power, and the other the weight. Levers are thus distinguished as of the first, second, or third kind, according as the fulcrum, the weight, or the power, is in the middle.

LEVERIDGE, RICHARD, a celebrated singer towards the end of the 17th and beginning of the 18th centuries, for whom Purcell wrote

most of his bass songs. He is best known by his music to Gay's 'Black-Eyed Susan.' During his life, Leveridge published several of his songs, in two 8vo. volumes. He died in 1758.

LEVROUX. [INDRE.]

LEVYNE occurs crystallised; primary form, an acute rhomboid. It is whitish, translucent, and has a vitreous lustre. Its elements are silica, alumina, lime, soda, potash, magnesia, and water, of which the first occupies about half the whole weight.

LEWES. [SUSSEX.]

LEWIS, MATTHEW GREGORY, a writer of novels, poems, and dramatic pieces, was born at London on the 9th of July, 1775. Lewis studied at Christ Church, Oxford, and afterwards lived for some time in Germany. There he became acquainted with Göthe and his followers, and imbibed the mysterious and tragic spirit of which his writings are full. Previously to his residence in Germany, when only sixteen years old, he wrote a successful comedy, called 'The East Indian.' The novel by which he is chiefly known, 'The Monk,' was published in 1794, when he was in his 20th year. In 1812 he introduced to the stage the drama of 'Timour the Tartar,' which is said to have had much influence in creating the taste for gorgeous pageants. Lewis died at sea, on the 14th May, 1818.

LEWISHAM. [KENT.]

LEX MERCATORIA, or LAW-MERCHANT, in a general sense, denotes the usages and customs of merchants, which, having been adopted as part of the law of most countries, and particularly of maritime states, for the protection and encouragement of trade, have been termed a branch of the Law of Nations. (Blackstone's 'Commentaries,' vol. iv. p. 67.)

The term Lex Mercatoria, when used with reference to English law, like the Lex et Consuetudo Parliamenti, merely describes a general head or division of the system. What customs or rules are comprehended under that division must always be matter of law for the consideration of the judges; and it was said by Chief Justice Hobart, that, if they doubt about it, they may 'send for the merchants to know their custom, as they may send for the civilians to know their law.' The principle seems to be as alluded to by Lord Hale in a case in Hardres's 'Reports,' p. 486, that the courts are bound to take notice of the general law of merchants; but that, as they cannot know all the customs which form part of that law, they may inform themselves by directing an issue or making inquiry in some less formal manner. The latter mode has not unfrequently been adopted in modern times, and evidence of mercantile customs has sometimes been given before juries. When the custom is ascertained, the court may declare it to be legal or not, according to their judgment; for the expression, that the court is bound to take notice of the general law of merchants, does not mean, or should not mean, that the custom, simply as such, must be recognised as law by the judges. The recognition of the custom by the judges makes it law.

LEXICON. [DICTIONARY.]

LEXINGTON. [KENTUCKY; MASSACHUSSETTS.]

LEYBOURN, WILLIAM, a mathematician of the 17th century. The date of his birth is unknown, but Dr. Hutton supposes his death to have happened about the year 1690. He was originally a printer in London, and published several of the works of Samuel Foster, the Gresham professor of astronomy. Among his published works are:—'Arithmetic,' 1649; 'The Art of Numbering with Napier's Bones,' 1667; 'Complete Surveyor,' 1653; 'Geometrical Exercises,' 1669; 'Art of Dialling,' 1687; 'Mathematical Recreations,' 1694; 'Panarithmalogia, or Trader's Guide,' 1693; 'Cursus Mathematicus,' fol. 1690. He also edited the works of Gunter.

LEYCESTE'RIA, a genus of plants of the natural family of *Rubiaceæ*. The genus consists of only a single species, *L. formosa*, a native of the Himalaya Mountains, at elevations of from 6000 to 7000 and 8000 feet, in Nepaul and Sirmore, where it grows among oaks and pines, and is therefore well suited to the climate of England, where indeed it may be seen growing in great luxuriance in some gardens.

LEYDEN, a city in the Dutch province of South Holland, 10 miles by railway N. from the Hague, is situated in 52° 9′ 30″ N. lat., 4° 29′ 13″ E. long., on a branch of the Rhine, and has 35,000 inhabitants. The town is traversed by many broad canals, which are bordered with trees, and which, intersecting each other, divide the town into 50 small islands, connected together by 145 bridges. It is surrounded with a rampart, on which are fine shady walks; and outside there is a deep and broad moat, crossed by 8 bridges leading to as many gates. The city is well built, and the principal streets are broad and well paved. The street in which the town-hall is situated extends nearly across the city from east to west; it is almost two miles in length, and is reckoned one of the handsomest streets in Europe. The houses are mostly of brick, with the gable-ends to the streets. Among the public buildings the most worthy of notice are—the town-hall; St. Peter's Church, the finest of the seventeen in the city; and the great hospital. An ancient castle or fort, ascribed by tradition to the Romans, stands in the middle of the city, and commands an extensive prospect of the town and the surrounding country. The manufactures of linen and woollens have declined considerably, but are still the most important in Holland. A great wool fair is held annually. There are likewise extensive manufactories of soap and indigo, tanneries, salt-works, &c. The most remarkable event in the history of Leyden is its successful resistance to the Spaniards in 1573. The university, which was founded in 1575, has a library of 60,000 volumes and 14,000 manuscripts, a valuable botanical garden, an observatory, a museum particularly rich in Egyptian and Etruscan antiquities, and a cabinet of natural history.

LEYDEN, LUCAS VAN, a very celebrated old Dutch painter and engraver, was born at Leyden in 1494. He distinguished himself even as a boy by his engravings, and was a famous painter as early as his twelfth year. He painted in dis-

temper a picture of St. Hubert, in 1506, for a citizen of Leyden of the name of Lokhorst, who was so gratified at the excellence of the work, that he paid him twelve gold pieces for it, one for each year of his age. Some of Lucas's early engravings are highly prized by print-collectors, and accounted among the greatest rarities of their class. He died in 1533, aged only 39.

Lucas's pictures are very scarce; they are in the old Flemish style, but are among the best works of that school. The galleries of Vienna, Berlin, Dresden, and Munich possess a few good pictures by Lucas; his own portrait is in the Berlin Gallery. A picture of the 'Last Judgment,' one of his most remarkable works, is still in the town-house at Leyden. The print of Eulenspiegel, a notorious clown or jester of the 14th century, is the rarest engraving in existence. Bartsch, who published a distinct catalogue of the prints of Lucas van Leyden, describes 174 engravings by him; in all, including wood-cuts, his prints amount probably to about 200.

LEYDEN, JOHN, M.D., was born Sept. 8, 1775, at Denholm, in Roxburghshire. His parents were engaged in farming. He applied himself to the study of medicine, and was appointed in 1802 as assistant-surgeon in the East India Company's service.

In 1803 he arrived at Madras, and directed his attention to the study of the Eastern languages. He was promoted to the professorship of Hindustani in the college of Fort William; and shortly afterwards to the office of judge of the Twenty-Four Pergunnahs of Calcutta. In 1809 he was appointed one of the commissioners of the Court of Requests in Calcutta; and in the following year assay-master at the Calcutta Mint. He accompanied Lord Minto in the expedition against Java in 1811, and died in that island on the 28th of August, in the thirty-sixth year of his age.

His treatise, 'On the Languages and Literature of the Indo-Chinese Nations,' is published in the 'Asiatic Researches,' vol. 10. His translation of the 'Malay Annals' was published after his death by Sir Stamford Raffles.

Leyden published many poems at various times, some of which were collected after his death by the Rev. James Morton, under the title of 'Poetical Remains of the late Dr. John Leyden, London, 1819. He was the author of 'An Historical and Philosophical Sketch of the Discoveries and Settlements of the Europeans in Northern and Western Africa, at the close of the eighteenth century;' of which an enlarged edition was published by Mr. H. Murray in 1818.

L'HÔPITAL. [HÔPITAL.]

LIAS, in Geology, the name of a series of argillaceous and calcareous strata, forming the basis of the oolitic system. [GEOLOGY.]

LIBA'NIUS was born at Antioch in Syria, A.D. 314. He taught the arts of rhetoric and declamation at Athens, Constantinople, and Nicomedia, and numbered among his disciples John Chrysostom and Theodore of Mopsuestia. The Emperor Julian was a great admirer of his works, and bestowed upon him the dignity of quæstor. The oratorical works and moral treatises of Libanius were published by Morel, 2 vols. fol., Par., 1606-27. The best edition of his declamations is by Reiske, 4 vols. 8vo., Leip., 1791. The letters of Libanius, which amount to more than 1600, were published by Wolf, fol., Amst., 1738.

LIBANUS. [SYRIA.]

LIBATION, an essential part of sacrifice among the Greeks and Romans. It consisted in the offering up of any liquid to the gods, usually of wine, water, or milk. Libations were also made at funerals.

LIBAU. [COURLAND.]

LIBEL (from the Latin *libellus*, a little book) is a malicious defamation, expressed either in writing, or by signs, pictures, &c., tending either to blacken the memory of one who is dead, or the reputation of one who is alive, and thereby exposing him to public hatred, contempt, or ridicule. (Hawkins, 'P. C.')

This species of Defamation is usually termed *written scandal*, and it is generally treated as a more serious mode of defamation than Slander. [SLANDER.]

Whatever written words tend to render a man ridiculous or to lower him in the estimation of the world amount to a libel, although the very same expressions, if spoken, would not have been slander or defamation in the legal sense of those words. To complete the offence, publication is necessary, that is, the communication of the libel to some person, either the person himself who is libelled, or any other. The mere writing of defamatory matter without publication is not an offence punishable by law; but, if a libel in a man's handwriting is found, the proof is thrown upon him to show that he did not also publish it.

Libellers may be punished by indictment or criminal information and by action.

Indictment or criminal information is for the public offence (as it is termed), for every libel has a tendency to a breach of the peace by provoking the person libelled; the civil action, which is on the case, is to recover damages by the party for the injury caused to him by the libel.

The truth of a libel was formerly no justification in a criminal prosecution; yet it was so far considered an extenuation of the offence, that the Court of King's Bench would not grant a criminal information unless the prosecutor by affidavit distinctly and clearly denied the truth of the matters imputed to him, except in those cases where the prosecutor resided abroad, or where the imputations were so general and indefinite that they could not be expressly contradicted, or where the libel was a charge against the prosecutor for language held by him in parliament.

A fair report of judicial proceedings does not amount to a libel, but a publication of ex-parte proceedings before a magistrate may be punished as such.

A petition, containing scandalous matter, presented to parliament or to a committee of either House, and legal proceedings of any kind, however scandalous the words used may be, do not amount to a libel. But, if the petition were delivered to any one not being a member of parliament, or the

legal proceedings were commenced in a court not having jurisdiction of the cause, they would not be privileged. Confidential communication reasonably called for by the occasion, as charges made by a master in giving the character of his servant to a party inquiring after it, or a warning by a person to another with whom he is connected in business, as to the credit or character of a third party about to deal with him, are considered as privileged communications, and are not deemed to be libels unless malice be proved, or the circumstances be such that malice may be inferred by the jury.

It was settled by an act of parliament that the jury must find not only the fact of publishing, but whether the matter in question be a libel or not (32 Geo. III. c. 60, extended to Ireland by 33 Geo. III. c. 43). In a civil action the question whether the publication is or is not a libel is decided by the judge or court.

The punishment in a criminal prosecution may be fine and imprisonment; and, upon a second conviction for publishing a blasphemous and seditious libel, the court might sentence the offender to banishment for any term it might think fit. (1 Geo. IV. c. 8.) But this was repealed by 11 Geo. IV. & 1 Wm. IV. c. 73.

The printer of a libel is liable to prosecution as well as the writer, and so is the person who sells it, even though he is ignorant of its contents.

By the 28th section of 38 Geo. III. c. 78, a bill of discovery may be supported against the editor of a newspaper, or other person concerned in the publication or interested in the property thereof, to compel a disclosure of the name of the author of the libel, or of the name of any person connected with the publication against whom the party libelled may think proper to bring an action; and such a bill may also be maintained against any person suspected of being the author, which would compel him to discover on oath whether he did or did not write the libel in question. (Holt 'On Libel.')

The Act of 6 & 7 Vict. c. 96, entitled 'An Act to amend the law respecting Defamatory Words and Libel,' has made some alterations in the law of defamation and libel. It enacts—§ 1, That in any action for defamation it shall be lawful for the defendant, subject to a certain notice in writing therein described, to give in evidence, in mitigation of damages, that he made or offered an apology to the plaintiff for such defamation at such time as in the said section is more particularly described.

§ 6 makes an important change. It enacts, That, on the trial of any indictment or information for a defamatory libel, the defendant having pleaded such plea as in this section is afterwards mentioned, the truth of the matters charged may be inquired into, but shall not amount to a defence, unless it was for the public benefit that the said matters charged should be published. The defendant must in his plea to such indictment or information allege the truth of the matters charged in the manner that is required in pleading a justification to an action for defamation.

§ 7 enacts, That when on the trial of any indictment or information for the publication of a libel, under the plea of Not Guilty, evidence shall have been given which shall establish a presumptive case of publication against the defendant by the act of any other person by his authority, it shall be competent to the defendant to prove that such publication was made without his authority, consent, or knowledge, and that the said publication did not arise from want of due care or caution on his part.

This act does not extend to Scotland (§ 10). As it was doubted whether or not it did extend to Ireland, this act was extended to Ireland by 8 & 9 Vict. c. 75.

Defamation and libel were punished among the Romans. The various rules of Roman law on this subject are stated in Rein, 'Das Criminalrecht der Römer.'

LIBELLULA, the genus of insects which includes the well-known Dragon-Flies. It belongs to the order *Neuroptera* and to the section *Subulicornes* in the arrangement of Latreille. The dragon-flies have horny strong mandibles and maxillæ, covered by the labrum and labium; their tarsi are three-pointed; their wings are equal; the posterior extremity of the abdomen is furnished with hooks or peculiar appendages. The size, beauty, and habits of these insects have rendered them favourite objects of study with the entomologist. In the larva state they live entirely in the water, engaged in unceasing war with other insects, which by singular devices they entrap and devour. Their pupa state is also passed in water, and, contrary to the usual habits of insects, is a period of activity and locomotion. They are then furnished with an extraordinary mask formed out of that part of the head which replaces the lower lip, and by which they cover the jaws and the whole under part of the head. They use it to alarm and seize their prey, projecting it at will. When perfect insects, they become inhabitants of air, and are endowed with extraordinary power of flight and precision of movement, performing astonishing evolutions. Their habits continue as ferocious as they were before. Several valuable monographs have been published on these interesting insects, but the most important and most recent is that of the distinguished Belgian zoologist, M. de Selis Longchamps, entitled 'Monographie des Libellulidées d'Europe.' In this work 61 species are described, arranged under the genera *Libellula, Cordulia, Lindenia, Gomphus, Cordulegaster, Æshna, Anax, Calepteryx, Lestes, Sympecma,* and *Agrion.*

In the arrangement of Westwood ('Introduction to the modern Classification of Insects') the genera of *Libellulidæ* inhabiting Britain are grouped under two sub-families, *Libellulides* and *Agrionides.* The following are the British genera:—Sub-family 1, *Libellulides.*—*Anax,* 1 species. *Æshna,* 7 species. *Cordulegaster,* 1 species. *Gomphus,* 2 species. *Cordulia,* 3 species. *Libellula,* 15 species. Sub-family 2, *Agrionides.*—*Agrion,* 13 species. *Lestes,* 3 species. *Calepteryx,* 4 species.

LIBER, the inner bark of a plant, is a layer consisting of woody tissue, cellular substance,

and vessels of the latex, forming a compact zone immediately applied to the wood. The woody tissue of which it is composed quickly becomes thick-sided, by the addition of internal ligneous strata, the consequence of which is, that such tissue in this part is more tough than elsewhere. Hence it is usually from the liber that are extracted the fibres employed in making cordage or linen-thread: this at least is its source in hemp, flax, the lime-tree, the lace-bark, and the many other exogens which furnish thread; but in endogens, which have no liber, as the cocoa-nut, it is the ordinary woody bundles of the leaves, stem, and husks of the fruit from which the fibre used for ropes is procured. It is said that certain exogens, such as *Menispermaceæ*, have no liber. In many plants a new layer of liber is formed annually, contemporaneously with a new layer of wood; but this is by no means universal; on the contrary, the oak and the elm increase their liber slowly and irregularly.

LIBER REGIS, another term for the *Valor Ecclesiasticus* of the 26th Henry VIII., is the book which contains an account of the valuation of the whole ecclesiastical property of England and Wales, on the eve of the Reformation. By an act of the 23rd of Henry VIII., the payment of annates, or the first-fruits of bishoprics and archbishoprics, with all sums paid for palls, bulls, and the like, at the consecration of every new prelate, were restrained. This was followed by an act in the 26th Henry VIII., for the payment not only of 'first-fruits of all dignities, benefices, and promotions spiritual,' but also of an 'annual pension of the tenth part of all the possessions of the church, spiritual and temporal, to the king and his heirs,' as supreme heads of the Church of England. The Valor Ecclesiasticus is the return which the commissioners under this act made into the exchequer. This record, in full, except certain portions which have been lost, was published under the orders of the commissioners upon the records of the realm, in 6 volumes folio, London, 1810–1834. An abridgment of it is preserved in the Office of First-Fruits, entitled 'Liber Valorum,' and was the foundation of the 'Liber Regis, vel Thesaurus Rerum Ecclesiasticarum,' by John Bacon, Esq., receiver of the first-fruits, with an appendix, &c., 4to., Lond., 1786. This latter work also contains an account of such benefices as have been since discharged from any payment to the above revenues, on account of the smallness of their income. Queen Anne, in the second year of her reign, gave up first-fruits and tenths to trustees who were empowered to administer them for the benefit of the poorer clergy. This gift of the queen was confirmed by act of parliament, 2 & 3 Anne, ch. ii.

LI'BERI, PIE'TRO, Cavaliere, was a celebrated painter of Padua, where he was born in 1605. He was the pupil of Padovanino, and is considered by some the best draughtsman of the Venetian school of painters. He died in 1687.

LIBE'RIUS was elected to succeed Julius I. in the see of Rome, A.D. 353. The Semi-Arians countenanced by the Emperor Constantius had then the ascendant, and both the council of Arles, A.D. 353, and that of Milan, 353, condemned Athanasius, bishop of Alexandria. As Liberius, together with some other Western bishops, refused to subscribe to this condemnation, he was arrested, by order of the emperor, and taken to Milan, where he had a conference with Constantius. The questions and answers in this conference are still extant in Constant's 'Epistolæ Romanorum Pontificum.' Liberius was deposed from his office, and banished to Berœa in Macedonia. The emperor caused Felix, a deacon at Rome, to be consecrated bishop. It was not till 358 that Liberius was restored to his see, and not without having first approved in several letters of the deposition of Athanasius, and subscribed to the confession of faith drawn up by the court party at the council of Sirmium. He died in 366. He was succeeded by Damasus I. Liberius is said to have built the Basilica on the Esquiline Mount, which has been called Liberiana, from his name, and is now known by the name of Santa Maria Maggiore.

LIBERTI'NUS. In the Roman polity persons were divided, with respect to status or condition, into freemen (liberi) or slaves (servi). Freemen, again, were divided into persons who were born in a state of freedom (ingenui), and libertini, or those who had been manumitted. A manumitted slave was called 'libertus,' that is, 'liberatus,' 'freed,' with reference to the act of manumission, and to his master, who, by manumitting him, became his patron (patronus): he was called 'libertinus' with reference to the class to which, by the act of manumission, he belonged.

A manumitted slave might either become a full Roman citizen or a Latinus, or he might obtain no higher privileges than the class called Dediticii. The grounds and conditions of this triple distinction are fully explained by Gaius (i. 12, &c.).

LIBERTUS. [LIBERTINUS.]

LIBERTY. This word is the Latin *libertas*. The corresponding Teutonic word is *freiheit*, or as it appears in English, *freedom*. [LAW.]

LIBERTY. The general nature of a liberty as a portion of the royal prerogative in the hand of a subject, has been already shown under FRANCHISE.

The fines paid to the crown for grants or confirmations of liberties are shown by Madox to have formed no inconsiderable part of the royal revenue.

The form in which the crown granted views of frankpledge [LEET] and other franchises may be seen in the charters granted by King Henry VI. to Eton College, and King's College, Cambridge (5 'Rot. Parl.,' 51, 97.)

A person exercising a franchise to which he has not a legal title may be called upon to show cause by what authority he does so, by a writ of Quo warranto, or an information in the nature of a Quo-warranto; and parties disturbed in the lawful exercise of a franchise may recover damages against the disturber in an action on the case.

LIBOURNE. [GIRONDE.]

LIBRA (the Balance). In the older Greek writers the Scorpion occupies two constellations of the ZODIAC, or rather the body of the animal occupies one, and the claws, *chelæ* (χηλαί), another. We say this, because, though the chelæ were

tainly a part of the Scorpion, yet they are often mentioned (as by Aratus, for instance) by themselves, as if they formed a distinct constellation. The word *chela* had several significations; so that it may have been by simple mis-translation that the Romans (according to Hyginus, Virgil, &c.) gave the name of Libra to the part of the heavens in question, and drew back the claws of the Scorpion to make room for the scales.

Libra is surrounded by Scorpius, Ophiuchus, Virgo, Centaurus, and Lupus.

LIBRARY. All the countries of the ancient world in which learning had established itself possessed libraries. The high price of books while all books were manuscripts only made it the more necessary that public libraries should be provided. Many collections of books were made by wealthy private individuals for their own use, both among the Greeks and Romans. Among the great libraries of antiquity were the library of the Ptolemies at Alexandria, the library of the kings of Pergamus, and that founded at Rome by the Emperor Trajan, which he called, after his own name (Ulpius), the Ulpian Library. The greatest libraries of the middle ages were those of the Arabs, established in their various dominions in Asia, in Africa, and in Spain, and the Imperial Library at Constantinople. The most extensive libraries in Europe are:—in Italy, the Vatican Library at Rome, the Magliabecchian Library at Florence, the Ambrosian at Milan, the library of Bologna, the University Library at Genoa, and that of St. Mark at Venice; in Spain, that of the Escurial; in France, the Royal Library at Paris, the Mazarin Library, and those of the Arsenal, of St. Geneviève, and of the Institute, in the same city, and the public libraries of Lyon and Bordeaux; in Germany, the Imperial Library at Vienna, the royal libraries of Berlin, Dresden, and Stuttgard, and the University Library of Göttingen; in Holland, the Public Library of Amsterdam, and the University Library at Leyden; in Russia, the Imperial Library at St. Petersburg; in Denmark, the Royal Library at Copenhagen; in the United Kingdom, the Bodleian Library at Oxford, the University Library of Cambridge, that of the British Museum in London, the Advocates' Library in Edinburgh, and that of Trinity College in Dublin. In the United States of America, according to the 'Encyclopædia Americana,' the principal libraries were, in 1831, that of Harvard College, containing 36,000 volumes (which in 1848 had increased to 82,000 vols.); the Philadelphia Library, containing 27,000; that of the Boston Athenæum, containing 26,000; that of Congress, containing 16,000; and that of Charleston, containing 13,000.

LIBRATION, a balancing motion, in which there is a position on one side and the other of which a body vibrates, being in fact the same in meaning as oscillation. This term is however particularly applied to a small irregularity, compounded of the moon's rotation round her axis and her orbital motion, by means of which her visible hemisphere is not always quite the same.

The mean revolution of the moon round her axis is the same period of time as her mean revolution in her orbit. If both motions were equable, the moon would always present the same face to a spectator placed at the centre of the earth, on condition that the plane of her equator passed through the centre of the earth. None of these conditions being exactly fulfilled, and the variations being small and periodic, the consequence is that a small portion of the moon's surface in the eastern and western edges, and also in the northern and southern, is alternately visible and invisible.

LIBYA. [Africa.]

LIBYAN DESERT. [Desert.]

LICENTIATE IN MEDICINE is a physician who has a licence to practise granted by the College of Physicians. There are two classes: licentiates who are authorised to practise in London and within seven miles thereof; and extra-licentiates, who are only privileged to practise in the country at a greater distance from the metropolis. The former class are authorised exclusively by the College of Physicians, but medical graduates of Cambridge or Oxford may practise in the provinces independently of the college licence.

LICHANO'TUS, Illiger's name for a genus of Cheiropeds or Quadrumanes (*Indris* of Lacépède, Geoffroy, and others) belonging to the family *Lemuridæ*.

The Indris are inhabitants of Madagascar, and two species only seem generally recognised, namely, *Indri brevicaudatus* of Geoffroy, *Lemur Indri* of Gmelin; and *Indri longicaudatus* of Geoffroy, *Lemur laniger* of Gmelin, *Indri laniger* of Fischer.

We will here give an original description by the writer of a specimen of the Short-Tailed Indri, taken from one of several seen in the Paris Museum. Anterior part of face nearly naked; forehead, temples, and throat, white; ears, occiput, shoulders, arms, and hands, black; lower part of back brown, dividing on the haunch into two lines, which run down the buttocks and spread on the thighs, leaving the croup, the tail, and the posterior part of the thighs, white; feet and anterior part of thighs deepened into black; heels white, with an anklet of grayish white; chest brown; abdomen white, as is also the inside of the arms; the thumbs, especially those of the hind paws, very large and powerful; fore toe small, and tied to the next almost to the last joint; nails small, flat, sub-keeled and pointed; first toe-nail long, flat, and sharp; fur beautifully soft and woolly. Length of head and body, 24½ inches; of tail, 3 inches; of hind foot, 7½ inches.

In the same museum we examined several specimens of a Lemurine animal termed *Envahis laniger*, which we doubt not is identical with the *Indri longicaudatus* of Geoffroy, and *Lemur laniger* of Gmelin. Hind limbs extremely long, and hind thumbs of extraordinary size; fur peculiarly soft, delicate, and curly, finer than wool; ears small, round, and buried in the fur; colour, rusty brown gray, the hairs of a leaden tint at the base; face, brighter red brown; on the knees and forearms a decided tinge of red brown; throat, chest, abdomen, gray; a spot on the haunches over the hip joint, and the back of

the thighs white; tail round, bright rufous or chestnut red. Length of head and body of the most perfect specimen, 15 inches; of tail, 14 inches; of hind foot, 4½ inches. Forehands long and slender; thumb, thin and feeble. Brought from Madagascar by M. Bernier, 1834. [LEMURIDÆ.]

LI'CHENIN, a peculiar vegetable product, sometimes called Lichen Starch. It is obtained from the *Cetraria islandica*, or Liverwort. When pure, it is white, and it retains water; but on drying it becomes yellowish. In thin plates it is transparent. It is tough, tasteless, nearly inodorous, swells up when put into cold water, but dissolves sparingly in it. It is composed of nearly equal equivalents of oxygen, hydrogen, and carbon.

LI'CHENS, a large and important natural order of imperfectly organised plants, containing numerous species employed in the arts as pigments, and as articles of food. It is principally in the former respect that they are of economical interest, in consequence of the great consumption of orchal, or archil [ARCHIL], Cudbear (*Lecidea tartarea*), and others by the dyer.

Lichens are perennial plants, requiring free access to light and air, of the most simple organisation, forming irregular patches upon the surface of stones, trees, the earth, and other bodies. They are distributed over all parts of the world, forming in the polar and similar regions a food for animals and man. *Cladonia rangiferina* supports the rein-deer, *Cetraria islandica* furnishes the nutritious Iceland moss of the druggists' shops; and various species of *Gyrophora*, under the name of Tripe de Roche, form a part of the supply of food scantily furnished by nature for the Canadian hunter. In warmer countries they acquire a firmer consistence, and appear to form secretions of a peculiar kind in much greater abundance than in the northern parts of the world.

LICHFIELD. [STAFFORDSHIRE.]

LICHTENBERG, a territory of 236 square miles, with 31,000 inhabitants, formerly called the lordship of Baumholder, and now included in the Prussian Rhein-Provinz. It was ceded in 1816 by Prussia to the Duke of Saxe-Coburg, who gave it the rank of a principality, and who held it till 1834, when it was again given up to Prussia for an equivalent of 80,000 dollars a year.

LICHTENBERG, GEORG CHRISTOPH, was born at Oberramstädt, near Darmstadt, July 1, 1742. By his father, who was the pastor of the place, he was early initiated into mathematical and physical studies. On the death of his father, he pursued his studies, first at Darmstadt, afterwards at Göttingen, at which university he was appointed to a professorship in 1770. Just before his promotion he had made a visit to England, where he was introduced to George III. He died at Göttingen, Feb. 24, 1799. Besides his commentary on Hogarth 'Erklärung der Hogarthischen Kupferstiche,' his other works are exceedingly numerous, and no less varied; for, while some are entirely scientific, on subjects of astronomy and physics, others are pieces of wit and satire, frequently of the most pungent kind.

LICHTWER, MAGNUS GOTTFRIED, was born at Wurzen, in Saxony, Jan. 30, 1719. He studied at Leipzig, and in 1741 went to Dresd and subsequently to Wittenberg, where he tained the degree of doctor of laws, and deliver lectures on jurisprudence, until the breaking o blood-vessel compelled him to abstain from spea ing in public. He now produced his 'Fabeln,' t first edition of which appeared anonymously 1748. The following year he went to Halberst In 1758 he published his didactic poem 'D Recht der Vernunft.' He died July 7, 1783.

LICINIO. [PORDENONE.]

LICI'NIUS, F. V. [CONSTANTINUS; DIOCL TIANUS; GALERIUS; MAXIMUS.]

LICINIUS STOLO, or *Licinian Rogatio* [AGRARIAN LAWS.]

LI'CINUS (Latreille), a genus of coleoptero insects included in the great group *Carabus* of t older authors. The genus *Licinus* is placed Dejean in his section *Patellimanes*, and, togeth with the genera *Dicælus*, *Rembus*, and *Badist* constitutes a little section or sub-family, disti guished from other Patellimanes by the want the tooth-like process in the emargination of t mentum. Three species of *Licinus* are Britis and about 12 are known, most of which inhal Europe.

LICTOR, a public officer who attended on t principal Roman magistrates. The kings, and afte wards the consuls, were attended by twelve lictor the dictator by twenty-four, and the master of t horse by six.

The duty of the lictor was to see that prop respect was paid to the magistrates, and to infli punishment on those who were condemned.

The lictors carried on their shoulders ro bound in the form of a bundle, with an axe in t middle.

LICUALA, a genus of Palms of the tri *Coryphinæ* of Martius. A species, *L. peltata*, described by Dr. Roxburgh as a native of t mountainous and woody parts near Chittagon He mentions the narrow leaves of his tree being formed into pipes for smoking tobacc while the broader are employed for wrapping u fruit, and for other domestic uses.

LIECHTENSTEIN, a sovereign principalit the smallest of all the states composing the Ge man confederation, is situated between the Rhin Switzerland, and the Tyrol, on the northern slo of the Rhætian Alps, the highest summits of whic rise to an elevation of 5610 feet. Its area is 5 square miles; its population is 6351. Th country is very mountainous; but it produc corn, flax, wine, fruit, and timber, sufficient f the consumption of the inhabitants, who have al a good breed of horned cattle. The Prince Liechtenstein possesses large estates in Upper S lesia and in Moravia, making together an area 2200 square miles, and yielding an annual reven of 1,500,000 florins. The house of Liechtenste is one of the most ancient in Europe.

LIE'GE, a province of Belgium, is bounded N by Limburg, E. by Prussia, S. by Luxembour and W. by Namur and South Brabant. Its are is 1116 square miles, and the population in 184 was 452,603, most of whom are Walloons. Th northern portion of the province is hilly and u

dulating; the Ardennes Mountains cover a great part of the south. The soil differs much in quality. On the west side of the Maas, and on the east side towards Limburg, the plains, valleys, and low hills are fertile and well cultivated; on the east side of the Maas, where it is joined by the Ourthe, especially towards Luxembourg, the soil is rocky and stony. In this part of the province there are extensive forests. The principal river is the Maas, which comes from Namur, and forms at first the boundary between the two provinces. After receiving the Ourthe, it flows between high, steep, and often perpendicular rocks to the city of Liège, where it becomes broader; below this it flows N. by E. into the province of Limburg. The climate is healthy. The country produces hops, corn, and a little wine; the pastures are good, and maintain great numbers of horned cattle and sheep. The mineral wealth of the country is considerable; there are mines of calamine, alum, lead, and iron ore; but more important than all these together are the numerous coal-mines of the province. Of the mineral waters those of Spa are the most celebrated. The manufactures, which are very important, consist of all kinds of steam-machinery for railroads and factories, mill-castings, fine woollens, merinoes, linen, cotton stuffs, cutlery and surgical instruments, fire-arms, glass, hardware, &c. The province is crossed by the Liège-Namur Railroad, and by the line from Ostend to Cologne. The number of steam-engines of different kinds in the province is between 400 and 500.

The capital is LIE'GE. *Glons*, a small place of 2000 inhabitants, N. of Liège, is the centre of a great straw-hat manufacture, which gives occupation to upwards of 6000 people. *Herstal*, or *Heristal*, on the left bank of the Maas, has important coal-mines, iron and steel works, iron-foundries, and 6000 inhabitants. Pepin-le-Gros took the name of de Heristal from having resided here. *Herve*, a few miles E. of Liège, has 3100 inhabitants, who manufacture woollen cloth, stockings, and shoes, and trade in cheese and butter. *Huy*, situated in a narrow valley, hemmed in by lofty rocks, on the Maas, here crossed by an ancient stone bridge, is strongly fortified and defended by a formidable citadel. This town is admired for its romantic situation. It has an interesting cathedral and town-hall. The population is 6880. Beer, spirits, paper, leather, linen, and cast iron are manufactured. *Limburg*, a small fortified town, which with its suburb *Dalhem* has 3000 inhabitants, stands 16 miles N.E. from Liège, and has manufactures of fine linen and woollen cloth. *Seraing*, S. of Liège, on the Maas, has coal-mines, important iron-foundries, and glass-works; population 3460. *Spa*, a well-built little town, famous for its mineral springs and baths, is situated in a pretty valley among the Ardennes Mountains, in the south-east of the province. The heights around it are covered with plantations, and laid out in delightful walks, which present at several points prospects of great beauty. The principal spring, called Pouhon, is situated in the town; 6 others are in the environs. The ordinary population of the town is 3600, who live chiefly by the profits derived from visitors to the waters. The bath-buildings, the several pump-rooms, and the Redoute, a handsome building which includes a café, theatre, gambling-rooms, &c., are the most interesting structures in Spa. The Spa springs are chalybeate; they are chiefly recommended in cases of relaxation of the bowels and obstruction of the liver. About 150,000 bottles are annually exported from the Pouhon spring, which is the strongest. Spa is famous also for the manufacture of elegant wooden toys, workboxes, writing-desks, &c. The mountains near the town contain many beautiful and extensive grottoes. *Theux*, S.E. of Liège, has black marble quarries, woollen-yarn factories, iron-works, and 4370 inhabitants. *Verviers*, a flourishing manufacturing town of 20,000 inhabitants, is situated on the Vesdre, about 20 miles by railway E. from Liège. It is irregularly built; but some of the suburbs are pretty. The town-house, theatre, the new church, and the college are the most remarkable public structures of the town. Verviers is famous for the manufacture of fine and ordinary woollen cloths and cassimirs, giving employment to 40,000 hands in the town and neighbourhood; the Belgian army is clothed principally from the looms of Verviers, the total produce of which is estimated at 1,000,000*l.* sterling annually. Flannels, serges, tickings, coverlets, mouselines de laine, merino, &c., are also manufactured. The dyes of Verviers are said not to be surpassed in Europe. There are also establishments for the manufacture of steam machinery, ironmongery, soap, beer, &c.

LIE'GE (*Lüttich, Luik*), the capital of the Belgian province of Liège, is situated in a valley at the junction of the Ourthe with the Maas, in 50° 39′ N. lat., 5° 31′ E. long., at a distance by railway of 58½ miles S.E. from Malines, 35 N.E. from Namur, and has about 60,000 inhabitants. The city is the seat of a bishop, and of the supreme court of justice for the provinces of Liège, Limburg, Namur, and Luxembourg. The Maas, on entering the city, divides into several branches which form islands, bordered by handsome quays and connected by 17 bridges. Liège is divided into the old and the new town, and has besides ten suburbs. Most of the streets are very narrow, dark in consequence of the height of the houses, and not clean. There are however a few broad streets, some good squares, and promenades. The city was formerly fortified, but at present it is defended only by a citadel, erected on St.-Walburg's Mount on the north side of the town, and by a great outwork on the west side. The most remarkable buildings are—the cathedral, built in the eighth century; the town-hall; the theatre; and the university, which was founded in 1817. There are a gymnasium, a bank, and numerous learned, charitable, and useful institutions. The extensive coal-mines near the town; its numerous iron-works, royal cannon-foundry, and establishments for the manufacture of fire-arms, hardware, broad-cloth, glass, and leather; its engine-factories, zinc-rolling mills, and naileries; its linen and cotton factories, steel-works, and breweries; together with a flourishing commerce in colonial produce and manufactured goods,—render it one of

the most important towns in Belgium, and one of the most industrial countries in Europe.

LIEGNITZ, one of the three governments into which SILESIA is divided, comprises the most north-westerly part of that province, and that part of Upper Lausitz which is now part of Prussia. Its area is 5300 square miles, and the population in 1846 was 912,497.

Görlitz, a well-built fortified town, is situated on the left bank of the Neisse, 60 miles by railway E. from Dresden, and has a population of 13,670, who are engaged in the manufacture of woollen cloth, linen, hosiery, leather, sheets, linen yarn, hardware, and musical instruments. The town has also a considerable transit trade. It contains 8 churches, a citadel, a town-hall, high school, 3 libraries, an orphan asylum, 4 hospitals, and a house of correction.

Glogau, a strong fortress on the left bank of the Oder, is situated in 51° 38′ N. lat., 16° 7′ E. long., 50 miles by railway E. from the Hansdorf station on the Frankfort-Breslau Line, and has 12,000 inhabitants. An island in the Oder is strongly fortified, and connected with the town by a wooden bridge. The town has 11 churches, a synagogue, 2 hospitals, 2 gymnasiums, and manufactures of woollens, printed calicoes, hosiery, tobacco, &c.

Liegnitz, the capital of the government, stands at the junction of the Schwartzwasser and the Katzbach, is 51° 12′ N. lat., 16° 12′ E. long., 180 miles by railway S.E. from Berlin, and has 11,607 inhabitants. The inner and older part of the town is surrounded with a moat and rampart of earth, which is laid out in gardens and planted with trees; it is entered by 4 gates. The chief buildings of the town are—an ancient palace, 4 churches, the royal equestrian academy, and a theatre; there are also a gymnasium, an orphan asylum, and two hospitals. The manufactures are cotton and woollen stuffs, silk, linen, hosiery, tobacco, starch, and beer.

Goldberg, situated on an eminence on the banks of the Katzbach, has double walls and four gates: the population is 7093. *Grünberg*, a walled town, with three gates, has 9973 inhabitants: both of these towns have flourishing manufactures of woollen cloths. *Herschberg*, S.W. of Goldberg, is the centre of a great linen manufacture, and has 7080 inhabitants. *Jauer*, or *Jauerbach*, stands S. of Liegnitz on the Neisse. It is a well-built town, surrounded by a double wall and a ditch, and has 5970 inhabitants, who manufacture broad-cloth, linen, hosiery, and leather. *Lauban*, on the Queis, a walled town, with four gates, has 5640 inhabitants, who manufacture calico and linen. *Sagan*, on the Bober, is a strongly fortified town, with three gates, a very fine ducal palace with a beautiful park, one Lutheran and five Roman Catholic churches, and manufactures of woollen cloth, linen, stockings, lace, and looking-glasses. The population is nearly 6000.

LIEN (from the French *lien*, 'a tie,' or 'band'). The following definition is perhaps as correct as any that has proceeded from the judges:—'A lien is a right in one man to retain that which is in his possession belonging to another till certain demands of him, the person in possession, are satisfied.' (Grose, J., in 'Hammond *v.* Barclay,' 2 East, 227.) The definition therefore includes possession (in some sense) by the party claiming the lien; and an unsatisfied demand by him against the owner of the property.

It has been said that 'liens only exist three ways; either by express contract, by usage of trade, or where there is some legal relation.' (Bayley, J., 1 Ba. and Ald., 582.)

When lien arises by express contract, it is simply mortgage, pawn, or pledge, which are then the more appropriate terms; or it is an agreement (such as may exist in the case of principal and factor) that goods intrusted by one person to another for the purpose of sale, or for some other purpose than pledge, may be retained by the party intrusted with them as a security for any debt or balance due to him from the other; or it is an agreement that he may retain the proceeds of things intrusted to him to sell, for the same purpose.

Where two parties have so dealt with one another that one has claimed and the other has allowed the right of lien in respect of any their mutual dealings, lien may exist in all cases of like dealings between them, if there be no verbal or written agreement to the contrary. The acts of the parties are here the evidence of the contract.

The 'lien by usage,' and that 'where there is some legal relation between the parties,' belong to one class, and are not distinguishable. They are both included under liens which arise from implied contract. The 'usage of trade' is merely evidence from which contract is to be implied: parties who mutually act in conformity to a custom have in effect, though not in form, made a contract. The term 'legal relation' is only another mode of expressing the mutual rights and duties of the same parties, who by their acts have brought themselves within the limits of a custom, and so given evidence of an intention to make a contract. Thus an innkeeper has a lien upon the horse of his guest which he takes into his stable to feed.

Lien, unless there be an express contract, or a custom to the contrary, must from its nature be *particular*, that is, must have reference to a particular transaction and to a particular thing. When it is *general*, that is, where the right to retain a particular thing is not limited to a particular transaction, but exists with respect to other transactions also, there must be express contract or the dealings of the parties must be such as to create that implied contract which arises from acts done in conformity to well-known usage.

Lien may be lost by voluntarily parting with the thing, by express agreement, or by agreement to be implied from acts. In general, when a person has a lien for a debt, he waives it by taking security for the debt.

In Equity, the vendor of an estate, though he has executed a conveyance and parted with the possession without being paid, still has his estate as a security for such part of the purchase-money as is unpaid. This security is generally, though not with strict propriety, called the vendor's lien. The ground of this so-called lien lies in the natu

of the contract: one party contracts to give land for money, and the other contracts to give money for land; and both parties must perform their engagement.

The practical questions which arise under the general doctrine of lien are numerous and sometimes not easy of solution; many of them are of the greatest importance to the mercantile community. The chief cases in which lien exists may be referred to the law of Agent, Attorney, Bailment, Carrier, and Factor. Montagu's work 'On Lien' contains a collection of a considerable number of particular instances.

LIEOU-KIEOU ISLANDS, also called LOO-CHOO, a group of islands lying between the Japanese island of Kioosioo and the Chinese island of Formosa. They lie between 24° 10′ and 28° 40′ N. lat., and 127° and 129° E. long., and are said to consist of thirty-six islands, of different but rather small dimensions. The largest of them, called great Loo-choo, is about 60 miles by 12. The surface of these islands is mostly uneven and rugged, but the elevations do not attain a great height. They seem to be of volcanic origin. The lower tracts are of great fertility, but the most elevated are generally bare and rarely covered with wood. The fertile tracts are in high cultivation, and the produce very varied. Cattle are not abundant, and are only employed for agricultural purposes. Milk is never used; hogs, goats, and poultry, with rice and other vegetables, form the food of the inhabitants. The inhabitants are rather low in stature, but are well formed, and have an easy graceful carriage; their colour is mostly of a deep copper. Their language is similar to the Japanese. They seem to have made considerable progress in several branches of manufacturing industry, and prepare salt from sea-water in an ingenious manner. They have doubtless some commerce with China and Japan; but very little is known of the island by Europeans. Two of the towns of the great island are named Napakiang and Shui. (Basil Hall's, Beechey's, and Parker's *Voyages.*)

LIERRE. [Antwerp.]

LIESTALL. [Basel.]

LIEUTENANT is an officer who discharges the duties of a superior in his name and during his absence, and who acts immediately in subordination to him when he is present.

Thus, in military affairs, the lieutenant-general and the lieutenant-colonel respectively superintend the economy and the movements of the army and the battalion under those who hold the chief command. The lieutenant of a company is also immediately subordinate to the captain, in whose absence he has the same powers. In the British service the lieutenants of the three regiments of foot-guards have the rank of captain: in the royal regiment of artillery, the royal corps of engineers and marines, and also in the fusiliers and rifle brigade, there being no ensigns, the subaltern officers are distinguished as first and second lieutenants.

A lieutenant in the royal navy takes rank as a captain in the army, and the number appointed to ships of war varies with their rate.

LIEUTENANT-GENERAL. [General.]

LIEUTENANT, LORD. [Lord Lieutenant.]

LIEUVIN. [Calvados; Eure.]

LIFE. Organic matter, in which alone the phenomena of life are cognisable to our senses, is distinguished from common or inorganic matter by several peculiarities of composition and structure. Twenty elementary substances occur in organic matter, viz. oxygen, hydrogen, nitrogen, carbon, phosphorus, sulphur, iodine, bromine, chlorine, fluorine, potassium, sodium, calcium, magnesium, silicium, aluminum, iron, manganese, copper, and lead. Of these the first four, on account of their universal presence in organic matter, have been called organic elements. But, although the elementary substances of which organic matter is composed are the same as those of common matter, their mode of combination is peculiar. In minerals, the elements are generally united in pairs, or according to a binary mode of combination; but in organic matter, three at least, and usually four elementary principles are combined in each simplest substance or proximate principle. In organic compounds again, the elements are not generally united in any simple ratio one to another, as 1 atom of one to 1, 2, or 3 of another, as in inorganic bodies, but several (as 10 or 12 of one) are united with several of each of the others to form one compound atom.

In respect of structure, it is observed that all organic bodies, plants as well as animals, have a more or less rounded and cylindrical, branched or membered form, bounded by curved lines, and by convex or concave surfaces very distinct from the crystalline, the only regular form of inorganic matter.

All the parts of an organic body are, both in their origin and in their continuance, more or less dependent upon one another. In their original formation, the production of one part induced that of another; and, when formed, the action of one influences the actions of all the others.

The maintenance of the living being, during a certain length of time, by the mutual changes which take place between it and the external world, is the most general phenomenon observed in organic bodies during life. It is a compound process, consisting, 1st, of the reception of materials from the external world, as nutriment, which is taken up by absorption and carried on by a peculiar motion in vessels, or through the interstices of the tissues. 2nd, Attraction of aeriform substances from without, and separation of other aeriform substances from within, constituting respiration. 3rd, Conversion of the nutriment and aeriform substances, imbibed into the peculiar fluids of the body—assimilation. 4th, The motion of these fluids through the body by a circulation or other means. 5th, Conversion of the fluids into a solid form, or the combination of them with the solids, so as to maintain the peculiar properties of the latter, constituting nutrition properly so called. 6th, The preparation and separation of fluids of peculiar kinds from the assimilated fluids, or the formation of secretions. These processes, which are called the nutritive functions, occur, in a more or less distinct manner, in all living bodies,

plants as well as animals, and are essentially characteristics of Life, to which nothing analogous is ever observed in inorganic bodies.

LIFE, DURATION OF. [MORTALITY, LAW OF.]

LIFE-BOAT; LIFE-PRESERVER. Many ingenious plans, more or less practicable, have been proposed for saving from drowning those who may be in peril by shipwreck or otherwise. These contrivances may be classed as *Life-Boats*, *Life-Buoys*, and *Life-Dresses*.

Life-Boats.—A life-boat is a boat constructed with great strength to resist violent shocks, and at the same time possessing sufficient buoyancy to enable it to float, though loaded with men and filled with water. Such boats are maintained at most of the ports of this kingdom, always ready to put to sea when vessels are seen in danger of shipwreck, and provided with means for being conveyed to the shore, and launched as rapidly as possible. As early as the year 1785, a patent was granted to Mr. Lukin for a life-boat with projecting gunwales and hollow cases or double sides under them, as well as air-tight lockers or inclosures under the thwarts: these contrivances increased the buoyancy of the boat, and the air-tight cases under the gunwales, by their weight when raised above the surface of the sea, and their resistance when depressed beneath, greatly prevented rolling. Mr. Lukin's boat was strong and buoyant, but it was liable to be disabled by having the sides staved in. This defect was obviated in Mr. Greathead's boat, which was invented soon after; its prevailing feature is that the boat is lined inside and outside with cork. Mr. Greathead's boat was instrumental in saving the lives of 300 persons in five years, near Tynemouth.

In 1839 Mr. Mackintosh of New York took out a patent for a sort of temporary life-boat. It consists of canvas rendered impervious to water by being saturated with a solution of caoutchouc. A square piece of this canvas is so hemmed at the edges as to leave a hollow tube or channel, which, when filled with air, may act as a buoyant cell or air-chamber. The opposite edges of the piece of canvas are partially sewn together, so as to give to it the semblance of a boat, the sewn edges being cemented with caoutchouc to render them air and water tight. Mr. Adams shortly afterwards contrived a boat lined with cork in the inside, and having air-vessels under the decks or seats. Holcroft's pontoon, or safety-boat, also of recent origin, has some peculiarities about it, on account of its portability. It is formed of a skeleton frame, easily detached and folded into one-sixth of the space which it occupies as a boat. The frame is covered with layers or folds of strong canvas saturated with India-rubber; and in various parts are cases or air-cells, partitioned off one from another. The portability of the boat is brought about by having the framework hinged to the keel, so that the sides close together like a portfolio. Captain Smith's paddle-box boats, for steam-vessels, originated from that officer having observed that there is room, upon such paddle-boxes, for a life-boat, without encumbering the ship in any way; and builders of steamers have devised a mode of ma the inverted boat a covering for the paddle- Other life-boats in great variety have been gested from time to time.

Life-Buoys.—Besides those life-boats w have been constructed for the especial pur there have been several inventions for conve ordinary ships' boats into life-boats upon a su emergency, which may be applied by the cre a ship in distress. Mr. Bremmer, about the 1800, proposed that empty casks should be stro fixed in ships' boats upon a plan describe him, which on trial was found to answer fectly. Captain Gordon's life-buoy consists series of bamboos of different lengths fast together; the uppermost piece is the longest, others diminish gradually to the lowest, whic the shortest of all; thus forming a triangle, w is covered with pieces of sound cork, strongly to the bamboo rods. Two of these triangles intended to be fastened to a boat, one on side, the long pieces being close to the gunw the shortest near the keel. Well-tarred sh skin bags, inflated with air; air-tight co tubing fitted under the seats of boats; and m other contrivances, have been partially used. mattresses have been found useful, but it wa leged that they gave sailors facilities to desert they were discontinued; floating ropes lined cork have also been suggested, but, like escapes, these contrivances are never at hand w most wanted. Boyce's life-buoy is intended kept suspended at a ship's stern, to be dro into the water in case a man falls overboard. is composed of two hollow wooden cylinders, e made air-tight or else filled with cork, and nected by a wooden grating, so as to form a of raft. It has been suggested to conver warping buoys which abound in our harbours a sort of life-buoys, by fitting them up with wo battens placed lengthwise from end to end their circumference. Cooke's life-buoy is fo of two hollow copper spheres connected by a zontal rod; and from the middle of the rod a vertical stem containing a fuse at the top. fuse is lighted, the buoy is lowered, and the son in the water, attracted towards the bu the light (if at night), seeks safety by clingi the floating mass. Captain Beadon's buoy sists of a metal tube, eight feet long by on in diameter, tapered at its after end: it is di into water-tight compartments, and has a ke or twelve inches deep. There is a kind of across the cylinder, on which a man may staff, on which a light may be kindled; paddle to work the buoy, or two oars hing it. Irvine's safety-portmanteau, which wil port two persons clinging to it in the Henvey's cork float; and Taylor's deck-cha among the numberless modern contrivance similar object.

Safety-Dresses.—Among these contriva the life-hat. The upper part of the crown hat is made air-tight and water-proof, so t the event of the wearer falling into the wa buoyancy may (according to the intention inventor) save him from being drowned.

lining of the hat is capable of being loosened, and the vacant space expanded by air being blown into it, so as to form a buoy capable of being grasped by any one immersed in the water, instead of being worn like a hat. Macintosh's life-cape is a waterproof garment, which is capable, by the introduction of air through a stop-cock into a vacancy formed by a double thickness of cloth, of being converted into a life-buoy. Air-tight jackets, belts, pads, cushions, &c., have been devised in many forms.

Besides all the above contrivances, may be mentioned those, such as Captain Manby's, in which a rope is propelled by a cannon from the shore to a ship in distress.

LIFE INSURANCE, OR REVERSION. By a reversion, in the widest sense, is meant a right of property the enjoyment of which is to commence at some future period, fixed or depending on contingencies, and is to continue either for ever or during a term either fixed or depending on a contingency: anything in fact which is to be entered upon, or which may be entered on, at a future time, is a reversion in books which treat on the value of property. The legal sense of the word is more restricted.

Thus an assurance of 100*l.*, or a contract to pay 100*l.* at the death of a given individual, is 100*l.* in reversion to the executors of that individual. Our object in this article is to treat of this most common species of reversionary contract, life insurance, or assurance.

The value of a reversion depends in a very easy manner upon the value of the corresponding annuity; that is, any given sum, say 100*l.*, to be received *when* a given event arrives, depends for its value upon that of 100*l.* a year to be received *till* the event arrives. Suppose, for example, that money makes five per cent., and that an annuity, say upon a life, is worth fourteen years' purchase, that is, 100*l.* paid a year hence, and again two years hence, and so on as long as the life lasts, is now worth 1400*l.* Required the value of 100*l.* to be paid at the end of the year* in which the life drops. We must now reason as follows:—Suppose a perpetual annuity of 100*l.* a year is to be enjoyed by A during his life and by his legatees after him. By hypothesis A's portion is now worth 1400*l.*, and (money making five per cent.) the annuity for ever is worth twenty years' purchase, or 2000*l.*; consequently, the legatee's interest is *now* worth 2000*l.*—1400*l.* or 600*l.* But at the end of the year of death the legatee will come into 100*l.* current payment, and a perpetual annuity worth 2000*l.*; for the remainder of a perpetual annuity is also a perpetual annuity: his interest will *then* be worth 2100*l.* Hence we have ascertained that 2100*l.* at the end of the year of death is now worth 600*l.*: and the rule of three then gives the value of any other sum: thus 100*l.* at the end of the year of death is now worth $\frac{600}{21}$*l.*, or 28*l.* 11*s.* 5¼*d.* Hence the following easy

Rule.—To find the value of a given reversion, subtract the value of the same annuity from that of a perpetual annuity, and divide the difference by one more than the number of years' purchase in a perpetual annuity: or multiply the excess of the number of years' purchase in a perpetual annuity over that in the life annuity by the reversionary sum, and divide as before.

Next, to find what premium should be paid for the reversion. A premium differs from an annuity in that a sum is paid down, and also at the end of every year: consequently it is worth one year's purchase more than an annuity. In the preceding question, the annuity was worth fourteen years' purchase; consequently the premium now is worth fifteen years' purchase. But the present value of all the premiums is to be also the present value of the reversion, or 28*l.* 11*s.* 5¼*d.*, whence the premium should be the fifteenth part of this, or 1*l.* 18*s.* 1*d.* Hence to find the premium, divide the present value of the reversion by one more than the number of years' purchase in the life annuity. But, when, as most commonly happens, the premium is wanted without the present value, the following is an easier

Rule.—Divide the reversionary sum separately by one more than the number of years' purchase in the perpetual annuity, and one more than the number of years' purchase in the life annuity: the difference of the quotients is the premium required. Thus, if in the preceding example we divide 100*l.* by 20+1 and by 14+1, or by 21 and 15, we find 4*l.* 15*s.* 3*d.* and 6*l.* 13*s.* 4*d.*, which differ by 1*l.* 18*s.* 1*d.*, the same as before.

The life we have been tacitly considering, when we talked of an annuity being worth fourteen years' purchase, at five per cent., is one of about thirty-six years of age. The first impression must be, that the proposed premium is ridiculously small. Make it up to 2*l.*, and it will be fifty years before the premiums reach 100*l.* Some such consideration must have moved the law officers of the crown in 1760, when they refused a charter to the Equitable Society, then charging a premium of about 4*l.* at the age of thirty-six, on account of the lowness of their terms. But it is to be remembered, that those who receive the premiums are to invest them immediately at five per cent., and are to invest the interest, thus making compound interest; persons aged thirty-six live, one with another, about thirty years, which is sufficient time for the premiums, with their interest, to realise 100*l.* for each person, one with another.

We now show the manner in which a simple result of calculation answers its end. To simplify the case, suppose an office starts with 5642 individual subscribers, each aged thirty years, the mortality among them being that of the Carlisle Table. The bargain is for a short assurance, as it is called, of twenty years, and of 1000*l.*; that is to say, the executors of each one who dies within twenty years are to receive 1000*l.* at the end of the year of death. Money makes three per cent. once a year. According to the table then, there are 57, 57, 56, &c., deaths in the successive years, and the following is the result, the proper premium being calculated at 11*l.* 12*s.* 3½*d.*

* Assurance Companies usually pay in a few months after proof of death, which gives a trifling advantage to the assured, not worth considering in a very elementary statement of the question.

each person, or more exactly 11,614*l.* 16*s.* for 1000 persons. It is supposed that there are no expenses of management. At the outset the office receives 65,530*l.* from the 5642 persons assured: this is immediately invested at three per cent., and yields 1966*l.* by the end of the year, making 67,496*l.* But, at the end of the year, the claims of the executors of fifty-seven persons who have died during the year are to be satisfied, which requires a disbursement of 57,000*l.*, reducing the society's accumulation to 10,496*l.* The contributors who are left, 5585 in number, now pay their second premiums, 64,869*l.*, so that, these being immediately invested, the company has 75,365*l.* at interest during the second year. This yields 2261*l.*, so that by the end of the year 77,626*l.* is accumulated. Then comes the demand of 57,000*l.* on behalf of fifty-seven contributors deceased during the year, which reduces the accumulation to 20,626*l.* This is more than it was at the same time last year. In this way the company goes on, accumulating to an amount which would lead a person unacquainted with the subject to conclude that the premium must be too large; in fact, ten years give an accumulation of 91,809*l.* But now the state of affairs begins to change; the contributors have been diminishing, while the claims have been increasing, until the yearly incomings no longer equal the outgoings. The accumulations then come in to make good the difference in such manner that by the time the remaining contributors come to be fifty years of age, and the claims of sixty-one who died in their fiftieth year have been satisfied, there only remains 8*l.* of the 91,809*l.*; and this 8*l.* is merely the error arising from omitting shillings, &c., in the calculation. Something of the same kind must take place in every office which dies a natural and solvent death; the only difference being that, when new business ceases, instead of a number of contributors all of the same age, and under similar contracts, both ages and contracts vary considerably.

There are certain tables which are variously named (sometimes after Mr. Barrett, the inventor, sometimes after Mr. Griffith Davies, the improver; sometimes after D and N, letters of reference used in them), but which we call Commutation Tables. They are described in the 'Treatise on Annuities' in the 'Library of Useful Knowledge,' and a copious collection is given: also in an article in the 'Companion to the Almanac' for 1840. They very much exceed in utility those which preceded them.

An Assurance Company is a Savings' Bank, with a mutual understanding, presently to be noticed, between the contributors. To make out this proposition, let us suppose that A borrows money, and insures his life for the amount as a security to his creditor. For this he has to pay a premium. If life were certain, the office of the company would be to receive and invest these premiums, which would be calculated in such a manner as with their interest to amount to a sum sufficient to discharge the loan in a settled time. At the end of this time the creditor (who has been all this while receiving interest for his money fro A) calls upon A to make his claim upon th office, and repay the loan with the money r ceived. If such an office existed, life bein certain, the rationale of the proceeding would b that the creditor, though tolerably confident A's power and willingness to make any yearl payment, whether of interest or instalment, wi not trust him steadily to lay by and impro yearly instalments, but requires that he shou make his instalments payable to third partie who are engaged not to return them on dema until they amount to a sum sufficient for th discharge of the debt. Such an office certain could not exist, on account of the uncertainty individual life. As soon, however, as it is know that the duration of masses of individuals can calculated with tolerable accuracy, there is remedy for the individual uncertainties. Let large number of debtors, similarly situated wi A, agree to be guarantees for one another; th is, let each of them pay during his life not on his own instalments, but such additional sums will provide the means of meeting the deficits those who die, and the savings' bank thus co structed will become an assurance office. course, it matters nothing whether these debto pay their instalments to a person agreed on amo themselves, or go to a company which undertak the management of such concerns. And, again, makes no difference whether the instalments a for liquidation of debt, or to accumulate a p vision for widows and children. We have tak the case of debtors, because in such a case office looks more like a mere indemnity office th when its contributors enter for the benefit of th families; still however, in the former case, it evident that the premiums are partly instalme of debts, partly sums intended to make good deficiency of the life-instalments of those who

Let us now suppose a company to be formed the simple purpose of assuring lives. Their b ness is to invest the premiums of those who ass with them; their receipts will consist entirely current premiums and interest on the investm of the old ones; and their outgoings will con expenses of management, payment of claims, chase of their own policies, and (possibly) lo by bad investment.

There is one question which is generally set at the very outset, namely, whether the comp is to be what is called Mutual, Proprietary Mixed.

A Mutual Company is one in which the mem stand bound to each other, and constitute the pany themselves. In such a company no ca is, generally speaking, raised at the outset, ex a small sum for necessary expenses at star This, however, is not necessarily the feature mutual company; for, if its members choose to stitute themselves an investment company as as an assurance company, they may, without l their mutual character, require every assurer also a shareholder. In a mutual company profits of course are divided among the assure

A Proprietary Company is one in which a of proprietors raise a capital and pledge it fo

payment of claims, in case the premiums are not sufficient: for this security they receive, in addition to the interest of their own capital, the profits of the assurance business. It has long been proved that, with proper tables of premiums, and a fair amount of business at starting, this capital is an unnecessary security; and the only reason which could now make such an office desirable would be the lowness of its premiums. Of course it matters nothing to the assured how they are paid, as long as they are paid; the capital may be diminished, but the assurer dreads nothing except its exhaustion before his turn comes. This must be the sole consideration with a person who is tempted by low premiums to a purely proprietary office: the nominal capital signifies nothing; it is upon the amount of assurance to which it (with the premiums) is pledged that the solvency of the office depends. Generally speaking, however, we believe it will be found that the purely proprietary offices have not allowed themselves to run much risk.

A Mixed Office is one in which there is a proprietary company, which does not take all the profits, but a share, the rest being divided among the assured. The only good effect of the capital upon the condition of the assured in such a company is this:—that the directors, having fixed capital as well as premiums, may justifiably seek for investments which a mutual company must avoid. Having the capital to make good purely commercial losses, they may perhaps attempt to get a higher rate of interest, and of course take more risk of loss; the assured, who are sharers in the whole of the profits, since the profits of premiums and profits of original capital are not distinguished, come in for their share of the extra profits of the capital. But no such attempt at gaining higher interest by secondary securities should be made until a sum sufficient (with future premiums) to meet all claims is invested in the very safest securities which the state of society offers.

There is much confusion in the ideas of many persons about interest, arising from not distinguishing between interest and other returns. Perhaps it would be best to retain the term interest in its general loose signification, and to subdivide it, for accuracy, into pure interest or net profit, debt-insurance, and salary.

In the construction of a table of premiums, three points must be left to the judgment of the constructor,—the rate of interest, the table of mortality, and the addition to be made for expenses of management and probable fluctuation, or discrepancy between the predictions of the table and the events which actually arrive. The third point would not arise if, as was once the case, the table of mortality made life much worse than the actually prevailing state of things shows it to be. Security against adverse fluctuation is thus taken in the choice of the table; and this was done by the older offices, which chose the Northampton Table—by the Equitable, for instance. But we hold decidedly by the method of choosing a true table, and augmenting the premiums given by it as a safeguard against fluctuation; and for this reason, that wrong tables are usually unequally wrong, making different errors at different ages, and thus augmenting different real premiums by different per-centages.

According to the Carlisle Table (which we prefer for the purpose), of 5642 persons alive at the age of 30, 3018 are alive at 65, whence the chance of living till the second age is $3018 \div 5642$ or .5525. Now by applying calculation to this question we find that an office which would have practical certainty (thousands to one for it) that, as far as this instance is concerned, the office should not be injured by adverse departure of events from tables, must make provision for twenty-five deaths, at least, in the period above-mentioned, more than the tables predict, out of 250 persons at the commencement. And this even on the supposition that the table itself can be certainly reckoned upon as representing the law of mortality of the whole insurable population. It would be a very long process indeed to apply calculation in detail, so as to form a well-supported idea of the proper amount of precaution against fluctuation; and the question is mixed up with another, to which we proceed.

The rate of interest to be assumed is an element which requires the greatest caution. It must be a rate which can actually be made, and therefore prudence requires that it should be something below that which may reasonably be looked for. To show how powerful an agent it is, we shall repeat the example already given, of the 5642 insurers for twenty years, on the supposition that the office which charges as for 3 per cent. finds itself able to make $3\frac{1}{2}$ per cent., and it will appear that the office leaves off with an accumulation of 15,441*l.* nearly; and, if it be lucky during the first years, it may be said to be safe against any fluctuation for which there is an even chance, by the increase of interest alone.

Take what amount of precaution we may, an office must, at first starting, depend upon something either of capital or guarantee. Even a mutual office must raise something at the outset. Tables must be constructed with very large additions to the calculated premiums, which are to meet the very earliest contingencies alone; indeed it is difficult to say what addition would be too large. But this point it is unnecessary to insist on, since we can hardly suppose it possible that any set of men would found an office with no resource except premiums from the very commencement. Supposing proper precautions to be taken, we imagine that an addition of 25 per cent. to premiums calculated from the Carlisle Tables at 3 per cent. per annum, is sufficient to place a mutual office upon a sound footing, and to give a very great prospect of a return in the shape of what is called profit. It never has been found that an office charging at this rate has been without surplus of some kind.

This surplus has been called by the inaccurate name of profit, whereas it is really that part of the security against fluctuation of interest and mortality which has been found to be unnecessary. In mutual offices it is to be returned to the assured in an equitable manner; in purely proprietary offices, it is really profit to the proprietors, whose capital has yielded them the ordinary interest,

since, by hypothesis, none of it has been necessary to meet claims, and they therefore share among themselves the residue of the premiums. It is impossible to avoid this surplus in a well-constituted office, for the mathematical line which separates surplus from deficiency cannot be expected to be attained, so that those who would not have the latter must take care to have the former. It is usual among the offices to adopt a plan for increasing this surplus, which we will now describe.

Two rates of premiums are adopted, the one less than the other. Those who pay the higher rate are to have a share of the surplus: those who pay the lower rate have nothing but the nominal sum for which they assure. If the table of lower rates yield a surplus (which it is supposed it will do), that surplus goes to augment the final receipts of those who assure for profits. This scheme may be very well practised by a proprietary company, or by an old mutual company, but whether it is a good plan for a young mutual company to adopt may be a question.

The public has been much misled by a notion that assurance companies must accumulate large profits, and the Equitable has been constantly cited as the proof. Now, all who would form an opinion on this subject must remember that the circumstances of the Equitable are very peculiar. It realised large accumulations, in the first instance, by an excess of caution commendable at the time, but since proved to be unnecessary. Of late years, newly assured parties are allowed to share in these accumulations, on condition that they are first assured in the office for a large number of years, taking the chance of receiving less than their premiums are really worth. This however is not the question here; we merely stop to remind the reader who is disposed to form a general opinion about offices, because the executors of A, B, and C receive two or three times the sum for which those persons were nominally insured, that this only happens because D, E, and F, who died during the days of a caution which has since been shown to be unnecessary, did not get their share of the then existing surplus.

The expenses of management are relatively trifling when the office has obtained a large amount of business, but they bear heavily on young offices during the first years.

The division of the profits (so called), that is, the method of returning to the assured the surplus of their premiums, with their accumulations of interest, has been the subject of much discussion. Offices have adopted very different modes of proceeding in this respect: some keep this surplus for the older members; some divide it by addition to the policies made annually, or at periods of five, seven, or ten years; some apply it in reduction of premiums as fast as its value is ascertained. Most, or all, of the methods followed by the offices seem to be fair, that is, they make the chance of surplus the same for one member as for another, at least of those who enter at the same age: if there be any thing inequitable, it arises when the premiums are disproportioned at different ages, so that the surplus is differently levied upon different classes of members. Leaving this however, we shall proceed to inquire what may be t probable amount of surplus in an office chargi premiums made from the Carlisle Table at 3 p cent., with 25 per cent. added, taking the mo favourable suppositions. Let the mortality be greater than that in the table, let there be no e penses of management, and let the office be able net 4 per cent. compound interest. Then we fi that the office is in reality charging for the follo ing sums, under the name of 100*l.*; that is to sa all the preceding suppositions being correct, t office might undertake to pay the following sur instead of the 100*l.* minimum which they do real guarantee. The sums are only roughly put dow within a pound or thereabouts.

Age.	£.	Age.	£.	Age.	£.
20	166	35	157	50	148
25	163	40	155	55	144
30	160	45	152	60	141

There is an inequality here which arises fro the supposition of the office gaining a greater i terest than was supposed in its tables; and it obvious that the young assurer must make th excess of interest more beneficial to the office tha the old one. Consequently, where an office realis some of its surplus by excess of interest, there equity in giving the one who entered young som what more than the one who entered later in li But this has never been the principle on whi any office made its divisions: some distingui those who have been a long time in the office fro those who enter newly, and the greater number those so distinguished must have entered young than the greater number of the undistinguishe but the intention of the office has no reference age at entry, but only to time of continuance.

The true method of determining the actual existing surplus must have some connection wi that which would be followed if the compa wished to break up, dividing its assets fai among the assured. Let us suppose the stock the company, all that it actually has or co realise, to be worth half a million, and that t premiums which the existing contributors wo pay are valued at another half million, while t claims of these contributors are valued at 750,00 Consequently there is a million to meet 750,00 or 133⅓*l.* can be given for 100*l.* Now supp that, instead of breaking up, the office wishes know how much it can afford to give in paym of a claim of 100*l.* The first question is, how this surplus arise?—the office has in possession prospect 250,000*l.* more than what is estimated be absolutely necessary. If this surplus re arose out of the natural operation of the premiu &c., it is clear that the office is now in a condit to pay 133⅓*l.* for 100*l.* Supposing this done the current year, the valuation of the next y will point out what alteration, if any, is necess This mode of division is the safest in the long because any excess in one year will be compens in future years. Another mode is to divide surplus of 250,000*l.* among the existing policies equitable proportions; and a third is to conside as advance of premium on the part of the exis contributors, and to diminish their future premi as if they had actually made such advance. I

not however our present purpose to extend an article already longer than we had intended it be, by entering into a lengthened explanation on this point.

The benefits of life assurance (which is in reality a large combination of small sums for the purpose of beneficial investment, with a contract among those who invest that the inequalities of life shall be compensated so that those who do not live their average time shall be sharers in the good fortune of those who exceed it), and the moral considerations which should induce every friend of his species to promote and extend it, are of course not the particular motives which actuate the founders of such offices, though no doubt they have them in the same degree as others. To bring business to a particular office becomes their interest and their object; and every possible mode of investment has been held out to engage the attention and suit the particular objects of the assurer. To this of course, in general, we do not object: for instance, when a company proposes twenty different kinds of assurances, it is enough for the public that the terms of each kind are sufficiently high, and not too high. But it sometimes happens that among the proposals which are held out for the assurer's acceptance are to be found some which altogether militate against the moral principles of assurance; these are prudence, foresight, and present self-denial for the attainment of ultimate prosperity and of present security against the chances of life. When an office announces that it is willing to leave a part of the premium in the assurer's hands, on his paying interest for it in advance, the office in the meanwhile holding the policy as a security,—what is it but enticing a person to assure for more than he can afford to do, and to borrow money for the purpose of paying the premiums? The office may, with caution, make itself secure; but it throws upon the customer the strong probability of future disappointment. When the time comes for thinking of the repayment of the advances which the office has virtually made, the assurer will frequently find himself obliged to sell that policy to the office which he had counted upon for the benefit of his family. Now out of the purchase-money must be deducted the sums in arrear to the office (upon which interest has always been paid in advance); and, when the assurer comes to put his balance against what he has actually paid, he will see that he never did a more imprudent act. The office is not to blame for any thing, but having thrown the original offer in his way; they have only lent him money on the same terms as they would have lent it to others; and they may say, and truly, that it was his own fault if he engaged in an imprudent speculation. But is it not, then, a fault to entice others to imprudence, knowing how much more easily men are induced to be imprudent than to be prudent?

LIFFORD. [Donegal.]

LIFFY. [Dublin.]

LIGAMENTS, in Anatomy, the organs by which the various articulations of the animal body are held together. [Articulation.] They are generally very strong membranes, and in their structure and composition resemble tendons. They are in most instances attached to two bones, and assist in the formation and strengthening of the joints.

LIGATURE, in modern music, a binding, indicated by a curved line, ⁀. If two notes of the same pitch are thus joined, only the first is to be struck, but the second is to continue its full time. *Ex.*:—

In vocal music all the notes which are set to one syllable are bound together.

LIGHT. It was once generally assumed that light consists of particles emitted from a luminous body; and this hypothesis may yet be conveniently adopted in explaining many of the phenomena of light and vision. A series of particles proceeding in a line constitute what is called a *ray* of light; and a small number of rays parallel to one another, or diverging from a point, form a *pencil* of light. In vacuo, and also in a uniform medium, the rays are conceived to be straight lines; but, at the surfaces and in the interiors of bodies, light suffers modifications, which generally produce deflections from the rectilinear direction.

The rays being supposed to diverge in every direction from a luminous object, it follows that, if a small cone of rays were intercepted by any plane surface, which may be considered as part of the concave surface of a sphere having the radiant point for its centre, the intensity of the light on the surface will be inversely proportional to the square of its distance from that point.

Certain astronomical phenomena (aberration, and the eclipses of Jupiter's satellites) prove that the propagation of light through space is not instantaneous; and that it takes place, in round numbers, at the rate of 192,000 miles per second.

By investigations purely mathematical it has been found that, if a small object be placed between two lights of different intensities, the point at which the object receives the least illumination from both is at a distance from either light directly proportional to the cube root of the intensity of that light, and inversely to the sum of the cube roots of both intensities. And if a luminous sphere, the intensity of its light being represented by i, subtend, at a certain point, a given angle $2\,a$; when at that point there is placed a small plane A inclined in a given angle b to the right line joining the point and the centre of the sphere, the intensity of the light on A will be expressed by

$$A\,i\,\pi\,\sin.\,b\,\sin.^2\,a. \quad (\pi = 3.1416).$$

Again, if light from any luminous object pass through a small aperture and fall upon a screen in a darkened room, there will be formed on the screen an inverted image of the object, its magnitude being inversely proportional to the square of the distance of the object: now the intensity of light on the image, which is inversely proportional to the square of that distance, is also inversely proportional to the magnitude of the image; and it follows that the brightness of the

image is constant whatever be the distance of the luminous object. The eye is such a darkened room, and therefore a luminous object should appear of equal brightness at all distances; but the absorption of light in the atmosphere causes the greater dimness of distant objects. If we suppose the quantity of light absorbed by a transparent medium to be a proportional part of the incident light, it may be shown that the intensity diminishes in a geometrical progression for equal spaces successively traversed.

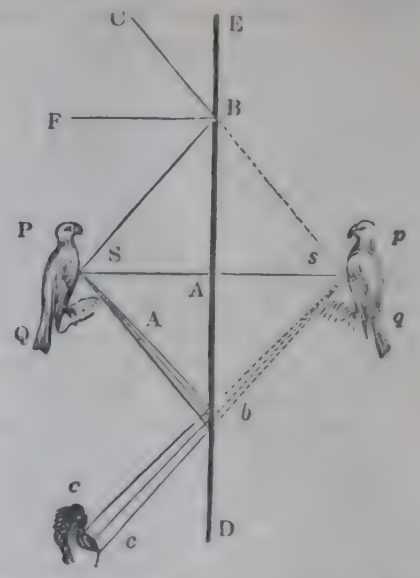
If a body on which light falls be unpolished and opaque, a portion of the light enters into it for a small depth, and is there partially absorbed; the complementary portion is scattered in all directions; the surface therefore becomes itself, to that extent, a source of light, but the composition of the differently coloured rays may be widely different from that of the incident light. When the body on which parallel rays of light fall is polished, the rays which do not enter the body are reflected from it principally in one direction; this, for a single ray, is in a plane passing through the ray perpendicularly to the reflecting surface (this is called the plane of reflection). By experiments made for the purpose, it has been found that the angle which the reflected ray makes with a line perpendicular to the surface is equal to that which the incident ray makes with the same line. This is an important law concerning the reflection of light, and it may be equally well accounted for on the theories of emission and undulation.

The *deviation* of a ray of light, after it has undergone any alteration in its course by the action of media, is the inclination of the primitive and final directions of the ray taken in the sense in which they are moving. This deviation by one reflection on any surface is the supplement of double the incidence, or is the double of the inclination of either ray to the medium.

When there are successive reflections, the inclination of the plane of the first to that of the last reflection is the *deviation in plane;* the last ray being then in a different plane from the first, the first kind of deviation or that of direction is the angle between the first ray produced beyond the incident point (which is the course the ray would have pursued if unreflected), and a parallel to the last ray drawn from the same incident point.

When light is reflected by two parallel planes, there will be neither deviation in plane nor in direction; more generally there will be no deviation in plane when the first incident ray is in a plane perpendicular to the intersection of the two reflecting planes.

When light diverging from any luminous point falls on a plane reflecting surface, it will after reflection diverge accurately from a point similarly situate at the opposite side of the mirror. Let S be the luminous point, DE the mirror; draw SA perpendicular to the mirror, and produce it until $As = AS$; let SB be an incident ray, join sB, and produce it to C; then it is evident that $\angle SBA = \angle sBA = \angle CBE$. Now BC, being in the normal plane SAB, and making, with the normal BF, an angle CBF equal to the angle SBF of incidence, must therefore be the reflected ray. The positio of s being independent of that of B, the point



incidence, it follows that every other reflected ray *bc* will diverge from the same point. Thus the reflected light will appear to an eye *c* as if proceeding from a point *s* behind the mirror similarly situated with S.

Hence, if any *body* PQ be placed before a mirror DE, the light which emanates from P will *appear* after reflection to proceed from the similarly situated point *p* behind the mirror, and thus an *image pq* exactly similar to the body PQ will be seen by looking at the mirror; the common looking-glass is a familiar example.

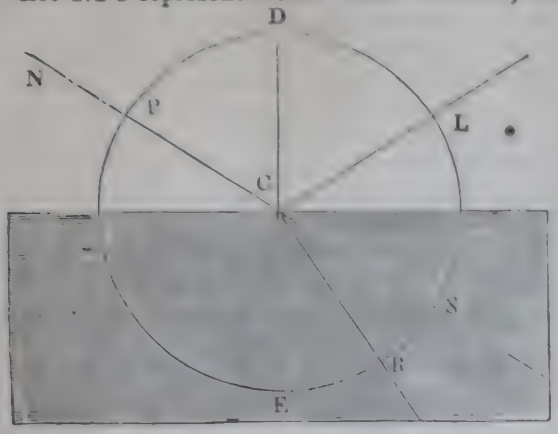
When light diverging from a point falls on a surface, after reflection it generally does not again converge to a point, or diverge from one accurately but, each infinitesimal pencil after reflection converging to or diverging from a point, the locus of all such points forms an illuminated surface called a caustic by reflection, or catacaustic: their equations and properties are rather objects of analytical exercise than of any practical use. The caustic is a luminous space when the incident light proceeds from a surface.

When light is incident on a transparent medium of greater density than that of the medium in which it originally moved, a portion of the light enters the medium, and then proceeds generally in one straight course in the plane of incidence, but not in the original direction, having a deviation in *course*, though not *in plane*, and sometimes, as in certain crystallised media, it splits into two rays, one in the plane of incidence as before, the other in a plane determined by the nature of the crystal. The same phenomena take place when light passes from a dense to a rarer medium, except that in this case the whole of the light may under certain incidence be totally reflected.

This alteration of the path of light passing from one medium to another, which is familiarly observed in the apparently bent form of a straight stick partially immersed in water in an oblique direction, is called refraction; that portion which in the plane of incidence is called the *ordinary ray*, and the other portion, which occurs in t

double refraction of uni-axal crystals, is called the *extraordinary ray*. We shall first attend to the laws of single refraction.

Let NPC represent a solar beam in vacuo, and



incident at C on a transparent medium (as water), to the surface of which DCE is normal. When the medium is fluid, place a graduated circle DSE in the plane of incidence, with its centre at C; a portion of the light will be reflected in the direction CL, and another entering the medium will be refracted in the direction CR. If uninfluenced by the medium, its direction would have been CS. The angle RCE is the angle of refraction, DCN or ECS of incidence, and SCR of deviation. The arcs DP, DL, are equal by the law of reflection, and, if we compare the arcs DP, ER, their sines will be found in a constant ratio, depending on the nature of the medium, but independent of the angle of incidence. Thus, if I be the angle of incidence, and R that of refraction, the two are connected by the simple relation sin. $I = \mu$ sin. R. The constant μ peculiar to the medium is called its *index of refraction*.

In order to account for the reflected ray C L, it is considered that, generally, the incident light consists of portions differently disposed to be subject to the impulsive and attractive forces of the medium, or, in Newton's language, are in *fits of easy reflection or transmission*. The reflection is found to be more copious as the angle of incidence increases.

By equating the velocities of an incident and refracted ray, when resolved in directions parallel to the refracting surface, we have, in the theory of emission,

$$V \text{ sin. } I = V' \text{ sin. } R,$$

V and V′ being the velocities of the incident and reflected ray respectively, I the angle of incidence, and R that of refraction; but, in the theory of undulation, we have

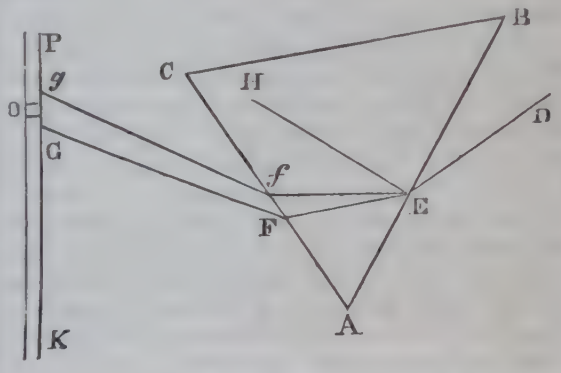
$$\frac{\text{sin. } I}{V} = \frac{\text{sin. } R}{V'}.$$

The ratio of sin. I to sin. R is constant in both theories; but the velocity of light in passing from a rarer to a denser medium must, in the doctrine of emission, be increased, and in the wave theory diminished.

The formation of foci and images by reflection and refraction are described in Optics; and the instruments constructed to take advantage of the properties of light, in Microscope; Mirror; Optics, Practical; Telescope.

Light, as we receive it from the sun or from other sources, as a star, a fire, a candle, &c., appears to the senses as a simple element; and, judging from our early impressions, we might consider the peculiar colours of bodies as inherent in those bodies; but we are enabled to trace the immediate cause of the colours of bodies, whether permanent or transient, by the analysis of light furnished by the well-known experiments of the glass-prism.

The triangular prism used for this purpose is a solid, terminated by two equal and exactly similar triangles, and having besides three plane faces of a rectangular form, contained by the sides of the triangles and by right lines or edges joining corresponding angles of the two triangular bases above mentioned; and any imaginary right line within it parallel to these edges around which the prism is capable of revolving is called the *axis of the prism*.



In the annexed figure the triangle B A C represents a section of the prism parallel to its basis or perpendicular to its axis. D E we shall suppose to be a ray or exceedingly narrow beam of solar light passing into a darkened room through a small circular hole in a shutter, and incident on the prism at E; this ray of white light enters the prism at that point, and, having undergone refraction by the dense medium of the glass, no longer proceeds as a simple ray E F, but is *dispersed* or divided into various rays of different colours over the space represented in the figure by f E F, and, emerging at f F from the prism, undergoes another refraction, such that the portion $f g$ of the ray proceeding from f is still more refracted than the portion F G from F, since, the sines of the angles of incidence and refraction being in a constant ratio, that portion will be most refracted which has the greatest incidence: let now this dispersed beam $g f$ F G be intercepted by a screen or wall P K, and from which extraneous light is as much as possible excluded, we shall then find the elongated space or spectrum g G brilliantly painted over with tints passing gradually and insensibly from deep red to an attenuated violet, in the following order, as described by Newton, and since very generally concurred in,—red, orange, yellow, green, blue, indigo, violet.

Suppose, now, that a small orifice O is made in the screen at some point of the spectrum, so that rays of any particular colour, green for example, may be transmitted through it; and let the transmitted portion be again subjected to refraction

through another prism, this beam being supposed very small, to ensure its purity or near uniformity of colour. It will not, after refraction, be again decomposed, or undergo any alteration of colour, except in respect to brilliancy, arising from absorption by the second prism: thus showing that light incident on the first prism, when once decomposed into homogeneous elements by refraction, is then, at least by refraction, not further decomposable.

If the original prism B A C be turned gradually round its axis, preserving always to the incident light the same refracting angle A, the spectrum G *g* may be made to descend towards K, but, after arriving at a certain point where the deviation, that is the inclination of D E produced to F G, is a minimum, it then reascends, and it is usual to make the chromatic experiments in this definite position of minimum deviation. This occurs when the position of the prism is such that the angles of incidence and emergence, or their complements D E B, G F C, are equal to one another.

We have seen that compound light, the sun's for example, may be decomposed into its homogeneous constituent rays by refraction through a transparent prism. Conversely it may be recompounded into light similar to the original, merely by making the rays, thus separated, by another refraction to occupy the same place. This may be effected by placing a prism of exactly similar material and form to that already used, with its refracting angle turned in a direction opposite to that of the former, so that the near faces of both prisms may be parallel; for the rays entering the second prism are in the same condition as if we supposed their direction inverted, that they may repass through the first; and therefore they emerge in a similar compound ray with the original, which may also be easily confirmed by experiment.

The rays issuing from the second face of the refracting prism may also be collected by means of a double convex lens, so as all to meet very nearly in its principal focus, where, if the image be received on a sheet of paper, the original compound light will be reproduced.

Many of the prismatic colours may be imitated by mixing colours taken as in the spectrum of greater and less refrangibility, as orange from red and yellow, &c., but such compound colours are not identical with the homogeneous light of the same colour, being immediately decomposable when viewed through a prism.

It would be difficult, if not altogether impracticable, to judge of the *dispersive powers* of transparent media by measuring the length of the spectra which they produce in a prismatic form, in consequence of the indefiniteness of their *termini*. Fortunately Nature has herself furnished a scale of definite limits in the beautiful discovery made by Wollaston and Fraunhofer of the existence of dark spaces, bands transverse to the length of the spectrum, and now generally designated Fraunhofer's lines.

These bands are best observable by forming the spectrum of a luminous line instead of a point, by means of a prism of great purity, and viewing it through a telescope of good magnifying power, though some of them may, when carefully pointed out, be recognised by the unassisted eye, and after one recognition are in future easily found.

Substances which have not a great difference of refractive powers possess frequently very different dispersive powers, and the angular dispersion by a medium is not proportional to the angular deviation, and therefore by a system of prisms, two or more, white light incident on the first may be reproduced from the last, though on the whole refracted from its original direction. Such a system is called *achromatic*.

Conversely, by forming an achromatic system experimentally, where the angles of the prisms are small, and in the position of minimum deviation, if the dispersive power of the material of one of them be taken as a standard, that of the other may be readily obtained, the dispersion being measured by $\frac{\delta\mu}{\mu - 1}$, μ being the index of refraction, and $\delta\mu$ the difference of its extreme values for any class of rays.

The rainbow is a beautiful natural exhibition of the dispersion of light into the spectral colours. [RAINBOW.]

Much has of late years been done in examining the nature and properties of light, and great advances have been made in the knowledge of its actinic properties. But the most important of all recent discoveries on the subject is that by Dr. Faraday, who made a ray of polarised light rotate under the influence of an electric current.

LIGHT, BAROMETRICAL, is a luminous appearance in the vacuum over the mercury in some barometers. It appears to be an electrical phenomenon, but we are not aware that any satisfactory explanation has been given of it.

LIGHT, CHEMICAL AGENCY OF. There are several cases in which light exerts direct chemical agency without its being referrible to the heat which usually accompanies it when intense. Thus, if a mixture of equal volumes of chlorine and hydrogen gases be kept in the dark, no combination takes place between them; but in the light of day they unite slowly, and form hydrochloric acid gas; while, if exposed to the direct solar rays, the combination occurs instantaneously, and with loud explosion. Chlorine gas and oxide of carbon, when mixed, unite by the direct action of the sun's rays. If colourless nitric acid be exposed to the sun's rays, it becomes yellow, and afterward red, and a quantity of oxygen is liberated by the partial decomposition effected by the solar rays. The action of light on the chloride of silver is very remarkable, and it occurs very quickly. This substance, as long as it is kept from the light, even though it be exposed to heat, remains perfectly colourless; but the sun's rays, and even diffused daylight, by their peculiar action blacken it speedily. Chemistry presents many such examples as these.

LIGHT-BALLS, for military purposes, are hollow cases, either spherical, or in the form of cylinders terminated at each extremity by a hemisphere: they are filled with a combustible composition, and being thrown, by night, in a burning state from mortars, or in some cases from the

hand, they serve to discover the working parties or troops of the enemy. The composition consists of pulverised saltpetre (6¼ lbs.), pulverised rosin (1⅞ lbs.), ground sulphur (2½ lbs.), and linseed oil (½ lb.). The balls are propelled from mortars varying from 4⅔ to 10 inches calibre, and correspond to the size of the mortar employed. Spherical cases of paste-board or canvas, filled with a composition which while burning emits a great quantity of smoke, are frequently discharged from mortars in order to conceal a movement of troops from the view of the enemy, or to suffocate the enemy: these are called *smoke-balls*.

LIGHTFOOT, JOHN, born 1602, died 1675, one of those English divines who belong peculiarly to the class called *commentators*. His works are collected in two large folio volumes, with an account of his life prefixed, to which we refer the reader for particular details. He was the son of a clergyman at Uttoxeter in Staffordshire, studied at Cambridge for the church, was ordained, and settled early in life on the living of Stone in his native county.

In the disturbed times he took part with the Presbyterians, became a member of the assembly of divines, accepted the living of St. Bartholomew beside the Exchange, and was made master of Catherine Hall by the parliamentary visitors of the university of Cambridge. He had also the living of Great Munden in Hertfordshire, which was presented to him in 1644. On the Restoration of King Charles II., Dr. Lightfoot complied with the terms of the Act of Uniformity.

LIGHTHOUSES are buildings erected along the sea-shore, or upon rocks, from which lights are exhibited at night for the direction of mariners. Floating Lights perform a similar office, being shown from the masts of vessels moored in certain positions, generally as beacons to enable ships to avoid shoals or sunken rocks in the æstuaries of great rivers. The most celebrated lighthouse of ancient times was that erected about B.C. 283, in the reign of Ptolemæus Philadelphus, on the island of Pharos opposite to Alexandria. [ALEXANDRIA.] It is from this building, or rather from the island on which it stood, that lighthouses have in many countries received their generic name of Pharos. The most celebrated lighthouses of modern times are, the Bell-Rock Lighthouse, opposite to the Frith of Tay; the Eddystone Lighthouse, opposite to Plymouth Sound; and the Skerry-Vore Lighthouse, recently completed (1849), on one of the rocks of a dangerous reef about 14 miles S.W. from the island of Tiree, on the coast of Argyleshire. [BELL-ROCK; PLYMOUTH.]

The erection of light-houses in this country has not proceeded upon any systematic plan, but in every instance they have been constructed simply because of the disastrous losses that had occurred for want of them. From this cause it arises that our light-house establishments in the several parts of the United Kingdom have until recently been conducted under entirely different systems, different as regards the constitution of the management, the rates or amount of the light-dues, and the principle on which they are levied. Under the operation of recent acts of parliament, all the public or general lighthouses around the coast of England are under the management of the Trinity House; those around Scotland under the Commissioners of Northern Lights; and those around Ireland under the Ballast Board of Dublin. There is a second class of lighthouses, consisting of local or harbour lights, which are managed by corporations and local trustees, under powers given for that purpose; but even these local lights are being brought more and more under general central authority. In 1844 the numbers were as follows:—

	Fixed.	Floating.	Total.
English, General . .	65	26	91
„ Local . . .	75	9	84
Scottish, General . .	29	0	29
„ Local . . .	38	0	38
Irish, General . . .	27	3	30
„ Local	30	0	30
	264	38	302

In addition to the above, there were seven lighthouses around the Isle of Man. The lighthouses are maintained by dues levied on all vessels which leave the harbours of the United Kingdom, at so much per ton per vessel, according to the number of light-houses which the vessels pass. These dues, which have amounted in some years to nearly 400,000*l.*, are in some instances very oppressive; but gradual improvements are being introduced in the whole system.

A principal object in the establishment of these buildings is to give intimation to vessels approaching the coast during the night as to the place in which they are. It is therefore of importance that the lights exhibited on the same line of coast should have some essential differences, so as to be readily distinguished by mariners. The different appearances thus required are given by having two lights placed either vertically or horizontally with respect to each other, or three lights, as at the Casket rocks, or by causing the lights to revolve or to appear only at certain intervals, and to remain in sight only for a given number of seconds at each appearance; or by the employment of lamps of different colours, as in some of the harbour-lights, which do not require to be seen at a great distance.

The mode of lighting now generally used in this country is that of placing an argand burner in the focus of a parabolic reflector. This instrument is made of silver strengthened with copper, and is about 3 or 4 inches in focal length, and 21 inches in diameter. The number and the arrangement of reflectors in each lighthouse depend upon the light being fixed or revolving, and upon other circumstances connected with the situation and importance of the lighthouse. The mode in use in the lighthouses of France consists in placing a large argand lamp, having four concentric wicks, and giving a very powerful light, in the centre of the upper part of the building, and placing around the lamp a series of glass lenses of a peculiar construction; thus using a refracting instead of a reflecting instrument to collect the light, and only one lamp instead of a greater number. The lens employed is about 30 inches square, plano-convex,

and formed of separate rings or zones, whose common surfaces preserve nearly the same curvature as if they constituted portions of one complete lens, the interior and useless part of the glass being removed.

Of the fixed lights of England and Scotland, in 1844, 76 were *catoptric*, or reflecting lights; while 18 were *dioptric*, or lens lights. The reflecting lights had, on an average, about 15 burners each; and the one burner of each lens light was about equal in efficiency to 14 burners on the reflecting principle. The English floating lights had an average power of about 12 burners each. The Irish lights are powerful; they presented an average power of 21 burners to each fixed light. The average annual cost for keeping up the fixed public lights is about 450*l.* per lighthouse.

In France, the lighthouses and harbour-lights are all under a public board; and the expenses are paid out of the treasury, and met by levying a port-charge of 10*d.* per ton upon shipping generally. In 1845 there were 52 general coast lighthouses, and 101 harbour-lights. In America, as in France, the lighthouses are maintained by the government.

Among modern contrivances for lighthouses is that of forming the body of the building of iron. Such was the light-house constructed by Mr. Alexander Gordon, in 1842, for Jamaica; and many others have since been made. These structures are formed of cast-iron plates, or in some cases of sheet iron, riveted together and braced in various ways, and having provision made for the contraction and expansion of the metal. Mr. Bush for many years advocated the use of a peculiar kind of floating light or light-house on the Goodwin Sands, but, after the expenditure of much time, money, and ingenuity, the project has failed. Another scheme, due to Captain Bullock, has for its object the construction of a safety beacon on the same perilous locality; and many other contrivances have been experimentally tried for the same purpose; but we believe none of these well-meant schemes have shown indications of permanent success. One of the most remarkable of modern lighthouses or beacons is the *screw-pile* lighthouse of Mr. Mitchell. This light-house is constructed on spots where a sandy soil would render a fixed structure unavailable. It consists of a light timber edifice, supported on eight or more very long and powerful piles, which are separately screwed down firmly in the sand by a screw formed at their lower extremity. One such lighthouse was constructed on the Maplin Sand at the mouth of the Thames, another at Fleetwood, and another at Carrickfergus. More recently, Dr. Potts has devised a mode of forming a foundation for a lighthouse on sand, by the sinking of hollow cylinders, through the aid of an air-pump, which pumps out the air from within the cylinder, so that the cylinder is forced down by atmospheric pressure.

LIGHTNING. The general circumstances attendant on a thunder-storm are familiar to most persons. It will however be useful to state some of the most prominent, with a view to their explanation when regarded as electrical phe mena.

At first, light clouds, some of which are tionary and others in motion, at times in contr directions, are formed in the atmosphere, whic then calm, and, with an elevation of temperatu experiences changes producing on the ani system sensations of faintness. A sound of tant thunder is heard, after which the lower reg of the atmosphere is refreshed with light bree The calm returns, but the thunder-clouds appro nearer, and flashes of lightning are perceived at sh intervals. The course of these is sometimes zigz when it is called forked lightning; the aberrati in its course show that it is near terrestrial obje and is therefore justly regarded as dangerous. a few seconds after the discharge, heavy show of rain or hail descend, and the atmosphere again cooled. The blackness now becomes u versal, and the thunder is heard in a loud a sudden clap almost at the same instant that lightning is seen descending towards the ea with immense velocity, and resembling a globe flame.

The colour of the lightning is a variable yell depending much on the density and composition the strata of air through which the discha takes place.

The identity of lightning with the discharge an ordinary electrical machine is now well kno [ELECTRICITY, ATMOSPHERIC]. Both can disso metals, inflame combustibles, reverse the poles magnet, and destroy animal life. Professor Ri man of St. Petersburg, having attached a spe of electrometer to his apparatus for measuring electric intensity of a thunder-cloud, immedia after a loud clap proceeded to read off the ind tion of his instrument, when a globe of elec fire was discharged through his body; he fell stantly quite dead, and decomposition ens within forty-eight hours (A.D. 1753).

When the electric discharge permeates gener the surrounding masses of weakly electrised vap the appearance then is that of a sudden and w illumination, as in summer or sheet lightn This lightning is harmless, and even beneficia indicating the restoration of atmospheric electric equilibrium after it has been destroyed the rapid succession of cold to heat.

The formation of vapour into rain and hail be attributed to its violent condensation by lightning, and the momentary vacuum in its r the coldness produced converting the rain hail: there are, however, other opinions on subject.

The changes of temperature, the electrici the earth in contact with the air, and that duced by the chemical changes of the va matters of the globe, are the great causes of spheric electricity: thus earthquakes, vol eruptions, &c., are generally accompanied by vi thunder-storms. [THUNDER-RODS.]

LIGHTS, ANCIENT. A Light is a righ the enjoyment of free access of light to a r premises or buildings, which right must not b paired by the building or erection of any obj such way as to obstruct the light. By the

Wm. IV. c. 71, § 3, an absolute right to light may now be acquired by twenty years' uninterrupted enjoyment, unless the use has been enjoyed by some consent or agreement made or given by deed or writing.

The right to the free enjoyment of Light belongs in the Roman law to the class of Servitutes, among which were the Servitus altius non tollendi, ne luminibus officiatur, ne prospectui officiatur ('Dig.' 8, tit. 2, s. 11, 12, 15–17).

LIGHTS, ARTIFICIAL. The modes of illuminating large buildings are explained in BUDE LIGHT; DRUMMOND LIGHT; and GAS LIGHTING; while the articles ARGAND LAMP and CANDLE illustrate the common modes of domestic lighting. A few other modes of artificial illumination will be here noticed.

The circumstance of palm-oil being in a solid state in our climate, coupled with an ascertained mode of separating it into three different substances, oleine, stearine, and margarine, has led to many suggested variations in the mode of making candles, by the mixture of one or more of these component elements with tallow or some kind of animal fat.

The Soho Lamp, patented in 1840, is intended for burning solid tallow or some other kind of fat, although the lamp itself is very similar in shape to many of those used with oil. The tallow is brought to the form of a long cylinder like a candle without a wick, and is placed in a vertical stem of the lamp; there is a spiral spring beneath it, which presses it up close to a conical cap or cover at the top. A fixed tube passes up through the centre of the cylinder of tallow, from top to bottom; and in this tube is placed a cotton wick dipped in wax, the height of which above the top of the tallow can be regulated by a rack, pinion, and nut. Palmer's candles, used in the patent candlesticks, effect the same object in a simpler way.

Under ARGAND LAMP, the general principle of oil-lamps is illustrated; all other varieties merely differ in details. One of the best kind is the mechanical or Carcel Lamp, so generally used by the opulent families in Paris. In this lamp the oil is raised through tubes by clockwork, so as continually to overflow at the bottom of the burning wick; thus keeping it thoroughly soaked, while the excess of the oil drops back into the cistern below. There is a lamp called the Meteor Lamp, having some of the properties of the Carcel, but intended to burn rape-oil. The internal arrangements of this lamp are curious and complicated. The lower part of the pedestal consists of a reservoir for containing the oil; and in this reservoir is a kind of piston or plunger, worked up and down by a nut and screw from the outside; the rising of this piston occasions the pressure or tightening of a coiled spring, and this pressure causes the oil to be forced up a central tube towards the flame. In Parker's Hot-Oil Lamp, the oil is kept between two concentric tubes near the flame, so as to become heated before it reaches the wick. The Solar Lamp is in principle an Argand, with the addition of a cap or cone to deflect the external air more directly toward the flame. Many of the modern variations in lamps and in gas-burners have had relation to this circumstance of admitting the external air to act at the points and in the quantity found best for the maintenance of a clear flame.

In chemical experiments the Spirit-Lamp has long been a valuable piece of apparatus; but the use of spirit instead of oil, as a food for lamps intended for domestic purposes, is a modern innovation, and has led to much mechanical ingenuity in the construction of the apparatus. The spirit here spoken of is the spirit of turpentine, called by the French *camphine*. All the Camphine Lamps now in use, whether called by the names of 'Vesta,' 'Gem,' 'Victoria,' 'Paragon,' 'Imperial,' or any other, present in common a reservoir, generally of glass, placed between the supporting pillar and the burner; the spirit is contained in this reservoir, and a cotton wick is seen to dip down into it. The chief points in which the several varieties of the lamp differ are in the arrangements for admitting air to the flame.

Dr. Fyfe ('Trans. of the Royal Scottish Soc. of Arts') in comparing gas, oil, and candles together, assumed an Argand gas-flame as a standard of intensity and price, and gives the following arrangement in respect to the ratios of relative cheapness, the intensity of light being uniform:—

Argand gas-flame	1.00
Solar lamp	2.00
Naphtha	2.00
Solar oil in Argand lamp	3.98
Whale-oil	5.00
Sperm-oil	8.00
Tallow candle (two wicks)	12.70
Cocoa candle	13.10
Tallow candle (one wick)	13.50
Composite	14.50
Palm	18.90
Wax	25.90
Diaphane	27.10
Margarine	28.40
Spermaceti	29.20
Composition	29.20

According to this table, composition candles are nearly thirty times as costly as gas for an equal intensity of light.

Proposals have recently been made (1848) to apply the electric light to useful purposes; but there are practical difficulties which have not yet been surmounted.

Dr. Faraday has introduced an important arrangement for carrying off the products of combustion in gas and oil lamps. Air is admitted to feed the flame nearly in the usual way; but, when the products of combustion have arrived at the top of the glass chimney, their progress is arrested by a covering of talc, and they are compelled to pass down between the chimney and another larger glass chimney concentric with it. The open space between the two chimneys communicates with a pipe which is conducted in any convenient way into the open air; the carbonic acid, aqueous vapour, smoke, and other emanations from the flame, have no means of escape except through this tube, and they are thus wholly cut off from contact with the air of the room. The mode of carrying out the arrangement may be varied in its details; but the general result is said to be that

the light is brighter, the space around the lamp cooler, and the air of the room less vitiated, than when common open burners are used.

LIGHTS, NORTHERN. [AURORA BOREALIS.]

LIGNIN, or vegetable fibre, is the substance which remains after a plant has had its soluble matter dissolved out of it. Lignin, properly speaking, constitutes the skeleton of the trunk and branches of the tree. It varies in different kinds, as to its colour, hardness, texture, and specific gravity. The texture of lignin is always porous; these pores, when fresh, contain the juices of different substances; during the drying of lignin the water evaporates, and leaves the matters dry which it held dissolved. When dry, lignin is a non-conductor of electricity. When exhausted of air in its pores, it is much heavier than water. When kept entirely dry, or entirely immersed in water, it resists decay for centuries; but, when alternately wet and dry, it gradually decomposes. The wood inclosing Egyptian mummies is found in good preservation, although some of it must be about 3000 years old.

Concentrated sulphuric acid in the cold converts lignin into gum; and, if the mass thus obtained be boiled with water, it is changed into grape-sugar. When wood (or lignin) is heated in iron cylinders, a great variety of important substances are obtained, besides charcoal—such as pyroligneous acid, pyroxilic spirit, creasote, and tarry matter.

LIGNITE. Fossil wood carbonised to a certain degree, but retaining distinctly its woody texture, is thus designated: a greater degree of change constitutes cannel and common coal, in which the original structure of the constituent plants can only with difficulty be traced; a less change belongs to peat, so that lignite occupies a place between coal and peat. Jet, Surturbrand, moor coal, Bovey coal, Cologne earth, and basaltic coal are considered to be varieties of lignite. Lignite often occurs in beds of considerable thickness and extent, and supplies to particular districts a bad substitute for coal. In general, lignite is most plentiful in the tertiary strata, and coal among the older rocks of the secondary series. Lignite is found in various parts of England, France, Italy, and Switzerland.

LIGNY. [MEUSE.]

LIGOZZI, JA'COPO, was born at Verona in 1543, and studied under Paolo Veronese. He established himself at Florence. Ligozzi was an effective and powerful colourist, and an excellent draughtsman. The Grand Duke Ferdinand II. appointed Ligozzi his principal painter, and superintendent of the Imperial Gallery. He died in 1627.

LIGU'RIA (called by the Greeks Ligystica, and the inhabitants Ligyes, and Ligustini), a division of ancient Italy, was separated in the time of Augustus from Etruria by the river Macra (*Magra*), and was bounded on the north-east by Gallia Cisalpina, and on the west by the province of Gallia. The most important places in Liguria were Albium Intemelium (*Vintimiglia*), a place of some importance, and a municipium, the capital of the Intemelii; Albium Ingaunum (*Albenga*), the capital of the Ingauni; Genua or Genoa; Dertona (*Tortona*), in the interior, a Roman colony, surnamed Julia; Alba Pompeia (*Alba*); Asta (*Asti*); and Pollentia (*Polenza*).

The Ligures in more ancient times extended as far as the Rhone in France; and they also appear to have inhabited part of Spain and Corsica. The Ligurians of Italy were finally subdued by the Romans B.C. 166.

LIGURITE, a crystalline mineral, of which the primary form is an oblique rhombic prism. Colour, yellowish green or apple-green, and translucent. As a gem, it is superior to chrysolite in colour, transparency, and hardness.

LIGUSTRUM, a genus of plants belonging to the natural order *Jasminaceæ*.

L. vulgare, Common Privet, is a bushy sub-evergreen shrub, growing in hedges and thickets in Great Britain, and native of the south-west of England. In point of utility and ornament few shrubs exceed the privet. Its chief use is to form hedges either for shelter or ornament. It bears cutting well, and is not liable to be disfigured by insects. Having fibrous roots, it robs the ground less than almost any other shrub. It is one of the few plants that will grow in the smoke of London; it also thrives under the dripping of other trees. The wood is hard and fit for timber. From the pulp of the berries a rose-coloured pigment may be prepared; with the addition of alum, they dye wool and silk of a good durable green.

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